

JOURNAL
OF THE
ASIATIC SOCIETY
OF
BENGAL.

EDITED
BY THE SECRETARY.

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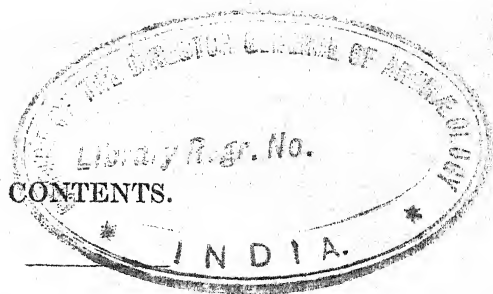
VOL. X.

PART I. JANUARY TO JUNE, 1841.

NEW SERIES.

"It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society in Calcutta; it will languish, if such communications shall be long intermitted; and will die away, if they shall entirely cease."—SIR WM. JONES.

CALCUTTA:
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Abstract Journal of the Routes of Lieutenants A. BROOME and A. CUNNINGHAM, to the sources of the Punjab rivers.

The object of the journey which we performed during the rainy season of 1839, was to ascertain the sources of the Punjab rivers; and at the same time to collect every kind of information that we thought might be useful and interesting regarding the countries through which we were to pass.

The plan which we laid down for ourselves was to travel in company northwards from Simla as far as Tandee on the Chundra-bhága river; and there separating the one to make a detour to the east, and return to Simla by the Spiti river; the other to pursue a westerly course over the hills to Kashmeer.

The source of the Beas river having been visited before by three different travellers; Moorcroft, Gerard, and Henderson, all of whom crossed the Sutluj at Bulaspoor, and proceeded through the state of Mundee to Sooltanpoor, the capital of Kooloo; we determined to vary our route from theirs as much as we were able; and with this view we crossed the Sutluj at Rampore on the 19th of June, by a *jhoola*, or swinging rope, from which a loop is suspended in which the passenger sits. On the 20th we crossed the mountain spur separating the Koorpua Nullah from the Sutluj by the Gai Ghatee, or Cow's Pass, 7,093 feet in height, and descended through a rich cultivation to the bank of the Koorpua Nullah, which we crossed by a *sanga*, or spar laid across the stream on the 21st., and ascending the Chenáhee Nullah we passed a water-fall of one hundred feet, and

reached the village of Suroua, situated in a lovely little valley, where we saw wheat as fine as any in England. Above the village, the valley is a level meadow about three quarters of a mile long by half a mile in breadth, surrounded on all sides by thick woods of walnut, chesnut, apricot, peach, and cherry, with acacia, mimosa, cypress, cedar, and every variety of pine: amongst which were white and red roses, jessamine, a white flowering thorn like may, and a beautiful large iris, besides wall-flowers, forget-me-not, strawberries and poleantus, with flowers of all shades of red, brown, and yellow. There were three waterfalls at the head of the valley; the lowest and least pouring down in one unbroken stream over the rock, which is naturally hollowed into a deep recess, forming a very pretty, cool, and musical bower.

On the 24th of June we reached the top of the Pass at the head of the Suroan Valley, called Chaol Ghaut, 10,170 feet high, where we halted for the night. Snow was lying in a sheltered ravine on the northern slope of the mountain, which is part of the lofty range forming the shed-water between the Sutluj and Beas rivers. Several of the peaks in this range are 18,000 feet in height, and are covered with perpetual snow. From this we descended over a clayey soil, made dangerously slippery by incessant rain, to the village of Bédath, at the junction of the two torrents which form the Teerthun river, along whose banks we proceeded for three days to Larjee, where it joins the Syneja river, and where about 100 yards lower down the united streams fall into the Beas river, just at that point where the Beas after running for a long course southward turns abruptly to the west through a narrow gorge, the channel of the three united streams not being so broad as that of any one of them. We were much surprised to find that this remarkable junction of three large streams was not esteemed holy. We rested in a large cave excavated in the variegated marble rock by Munnee Ram, a former Wuzeer of Kooloo; who, we were told used frequently to come to this place for many days together to escape from the cares of state; but more likely he came to bathe at the junction of the three rivers, for a more sterile and inhospitable place could not be conceived.

We then ascended the course of the Beas river, which widened
 Beas river. after a few miles into a beautiful large valley;
 generally about half a mile across, and wooded
 down to the water's edge, with a broad winding stream variegated

with many islands. We crossed the Gomuttee river, a considerable tributary on the left bank of the Beas, by a rickety wooden bridge, and passed over the Beas itself upon inflated buffalo skins to the fort of Bajowra, where the road from Mundee, by which Moorcroft, Gerard, and Henderson had travelled joins the road from Rampoor. On the evening of the 29th of June we reached Sooltanpoor, the capital of Kooloo, and found lodgings ready for us in the house of the former Wuzeer of Kooloo. On the following day we paid the Rajah a visit of ceremony. He was the same Ajeet Singh whom Moorcroft had seen; but when we saw him he was completely at the mercy of the Sikhs, who lorded it over him, even in his own Durbar.

The capital of Kooloo, Sooltanpoor, or as it is sometimes called Rughoo Náthpoor, from the chief temple being dedicated to Rughoo-nath, could never have been extensive, and it was then daily becoming less. It is situated at the confluence of the Serbullee, a small stream, with the Beas river. It has but two streets, but they are paved with boulder stones, as are likewise all the lanes. The houses are built of stone and wood, but we saw none of any particular neatness. Goitre was prevalent, diseases of the eye common, and extreme dirtiness universal. The annual revenue was said to be 1,20,000 Rupees, of which the Sikh Government seized 70,000.

We left Sooltanpoor on the 3rd of July; but instead of crossing the river to the left bank, as Moorcroft did, by the two bridges immediately above the town, we proceeded along the right bank. The valley opened as we advanced, and the scenery became bold and beautiful. The islands were numerous and well wooded; and the banks were alternately gentle slopes covered with grass to the water's edge, and steep alluvial spurs overhanging the river, and covered with apricots, peaches, apples, pears, figs, and grasses all growing wild; further on, were the pine-clad slopes of the mountains on each bank, the nearest green, the more distant blue; and beyond all, appeared the lofty snowy peaks at the head of the river.

On the evening of the 4th of July we halted on a low bank, close to a hot well, called Seeta Koond. The well was surrounded by a square enclosure with a few stone figures of deities placed in the corners. The temperature of the water was 104°. of Faht. the spring has probably some connection with the hot wells at Biseshta-moonh, on the opposite

bank of the river, which were visited by Moorcroft, who however does not mention their temperature. In the morning we continued our journey, and after passing through a forest of noble cedars we reached the village of Booruwa. There the scenery was very picturesque. On the left and to the front were snowy peaks; but to the right there were steep cliffs of gneiss, resembling "castellated parapets," as Moorcroft described them twenty years ago. At two miles beyond this we passed Kothee, the last village in the vale of the Beas river, and proceeded to a very pretty level spot of ground called Ralha, surrounded by high cliffs, and steep green slopes, and where the Beas was so narrow that one might have jumped across it. In the morning we made a laborious ascent of two miles by an irregular flight of steps, built about 25 or 30 years ago by a Brahmin, who had charge of the custom house opposite the village of Koshee. The road was then tolerably level for about a mile; after which it continued ascending for two miles, crossing all the ravines on hard snow beds, which even then, 7th of July, had not melted, until we reached the head of the Pass, where from beneath an enormous block of mica slate, the infant Beas had its birth at a height of 12,941 feet. On the top of this block we built a pile of stones, and in the midst erected a slab on which we inscribed our initials. The crest of the Rotung-joth, or pass, is a little higher than the mica slate block, or just 13,000 feet, from which it slopes gradually to the north for about a mile over a hard bed of snow. The heat and glare reflected from the snow were intolerable, and our faces were completely blistered. From this the view of the snowy peaks of Tartary, the land of undissolving snow, was extensive and beautiful. Three thousand feet beneath us rolled the Chundra river, which even there was a deep stream, 100 feet wide; and on all sides was dazzling snow, from the midst of which towered the gigantic mountains,

— Whose lofty peaks to distant realms in sight,
Present a Siva's smile, a lotus white.

One of the peaks, about twenty miles higher up the river, appeared like a mighty natural obelisk against the cloudless blue sky. It is called *Indr-sar-deo-ka-thán*, or "the abode of the supreme deity, Indra."

The descent was steep and rugged for about three miles to the bank of the Chundra river, which we crossed by a suspension bridge made of

birchen twig rope, having a span of 106 feet, and a height of forty feet above the stream. We halted at Koksar, the first village in Lahul, and the highest on the bank of the Chundra, at an elevation of 10,053 feet. There was not even a bush to be seen as far as the eye could reach, although the vegetation around the village was rich and luxuriant, the whole ground being covered with strawberries, dwarf irises, hyacinths, and pinks; there was also one primrose in blossom on the 8th of July.

From Koksar we proceeded along the right bank of the Chundra for five miles to the village of Tehling, where we saw on both sides of the river a few poor withered looking yews; snow was lying in all the gorges and ravines; and even in the bed of the main stream there were large masses forty and fifty feet thick on each side, which had only recently been cut through by the current and undermined. In two days we reached the village of Gooroo Guntall, twenty miles below Koksar, at the junction of the Chundra and Bhaga rivers, whose united streams form the Chundra-Bhaga, or Chenab river, the Sandabal of Ptolemy the geographer. There we halted as the birchen bridge over the Bhaga river had been swept away; and on the following morning we ascended the left bank of the Bhaga for about four miles, and passing through the large villages of Gwajun and Kardung, we reached a wooden bridge, forty feet span and forty feet in height, by which we crossed the stream, and then descended it for four miles to Tandee, the chief village of Lahul, which is exactly opposite to Gooroo Guntall, the village from which we had started in the morning. The only trees about Tandee are yews and pollard willows. On the banks of the Bhága however there were pines; and we found plenty of wild gooseberries of which we made very good puddings: some of these gooseberries that we bottled with snow water remained perfectly good after a journey to Simla, where they were cooked and eaten. We saw some yellow roses too on the banks of the Bhaga, and some columbine near Tandee. The crops consist of buck-wheat, common wheat, and barley; of which buck-wheat is by far the most common. The crops frequently fail either through the backwardness of the warm season, or through the early setting in of the long winter; indeed for three years before our arrival at Tandee there had been no good crops of wheat or barley. The natives however attributed this failure to the displeasure of Provi-

dence on account of the conquest of the country by the Sikhs, and the expulsion of the Raja of Ludákh.

At Tandee we heard of the death of Runjeet Singh; and it was currently reported that we had been sent to take possession of the country: this indeed we might easily have done, for our party mustered about one hundred people; and the natives of Lahul are so cowardly that Moorcroft relates they on one occasion, when invaded by a small party, buried their swords and fled to the more inaccessible parts of the mountains. Here we parted company on the morning of the 15th of July; the one to ascend the Bhaga river and to return to Simla by the Spiti river; and the other to follow the Chundrabhaga and to proceed through Burmawur on the Boodhil river to Chumba, and from thence to Kashmeer.

On Lightning Conductors to Powder Magazines. By W. B. O'SHAUGHNESSY, M. D. Assistant Surgeon, Bengal Medical Service.

The paper now published by Prof. O'Shaughnessy is in continuation of his paper on Lightning Conductors, which appeared in No. 99 of this Journal. The positions contained in that former essay having been arraigned in a contemporary publication,* the Professor put forth a rejoinder to the exceptions taken against his views and statements by the writers above alluded to, and then placed his rejoinder in my hands for publication in this Journal, as a necessary sequel to his original essay. The circumstances under which the paper now published was written, give it of necessity a certain controversial tone, which I have felt myself bound to account for, while laying before my readers a paper, without which the essay on Lightning Conductors, already in their hands, would be incomplete.



To the Editor of the Calcutta Journal of Natural History, &c.

Illness and absence from Calcutta have prevented my sending an earlier notice of the article which has appeared in your last number relative to the attachment of lightning rods to Powder Magazines.

The only point in the article in question, which I feel myself called upon to notice in your pages, is the attempt of your correspondent to shew that I had falsely described the spear-head of the Britannia on

* Dr. McClelland's Quarterly "Journal of Natural History."

Government House, as having been partially fused by lightning, on the occasion of the building being struck on the 29th of March 1838. Your anonymous correspondent accuses me of such shameful falsehood, on grounds which I shall take up in the order he gives them.

1st. That he examined the identical piece of iron, which he states now forms the point of the spear on the Britannia, and that he could observe no evidence of fusion.

As the marks of fusion I saw and described, were not larger than the size of a grain of duck shot or a small pea, and as the iron (supposing the piece to be identical, which I shall presently shew strong reason for doubting) must have been exposed to the weather for two years and ten months, an impartial writer should rather have concluded that the marks had been effaced by the exposure, than that I had stated what was untrue.

Accordingly your correspondent asserts, *secondly*, that he obtained testimony of the individual by whom the repairs were executed; who gave negative evidence to any alteration having been made in the point.

In justice to myself, I am bound to protest against such evidence being for one moment attended to—"Anonymous" No. 1, charges me with falsehood, and adduces the testimony of "Anonymous" No. 2, to corroborate his case—and this in a simple matter of fact. *Opinions* or arguments are as strong in every respect, though expressed anonymously as when authenticated by the writer's name. But on questions of *facts*, personal testimony must ever preponderate. Why does not your correspondent come forward in his own name? His papers are highly creditable to his abilities, and his testimony would then be of value as to any fact he asserts.

But receiving the case on internal evidence alone, it might be that no alteration was made in the point during the repairs; it might be that the spear-head is the same as that struck, and nevertheless it is but the natural consequence of the corrosion of an iron point by the influence of climate, that the appearances I *saw* may have been entirely obliterated.

Thirdly. He accuses me of error in speaking of the spear-head, when I should have called it the spear-point. This is not worth rejoinder. Nothing but the mere spirit of hyper-criticism could condescend to such trifling.

Fourthly. He asserts that the lower portion of the wooden spear shews no evidence of the lightning having passed through it. Neither should it, as it never was touched.

The lightning first fell on the point, the concussion shivered the spear, and the arm of the statue; from the point it struck the copper of the dome, and thence by three divisions it entered the house, as described in the accompanying report.

Fifthly. The writer states, "there is no evidence of a direct or lateral discharge on the spikes with which the head of the figure is covered." These may or may not have been affected, there was no examination made of the spikes at the time, as I had no fancy to climbing the scaffolding for the purpose, and as far as their having been struck or not affects the question of the point, those who know the freaks and antics which lightning displays in its course, will readily admit that one metallic point may be struck close to another, without this being interfered with in the least degree.

Lastly. He dwells emphatically on the circumstance that neither Captain Fitzgerald nor his Assistant Mr. Barnes, the overseer, have in any way publicly confirmed my statement, although they are both in Calcutta, and could have been appealed to.

On this I have to observe, that the writer is (perhaps better than any other person) aware of circumstances which rendered it difficult for me to appeal to Capt. Fitzgerald or Mr. Barnes on this subject—nor did I then, nor do I now, feel the necessity of such an appeal. I described what I saw. My character for veracity must stand or fall by the correctness of my statement; had the gentleman alluded to, or his assistant publicly contradicted me, it would still be a question with every impartial man, which statement was to be believed implicitly; and most observers would probably conclude, that it was more likely that the marks of fusion I described had escaped the attention of these individuals, than that I had wilfully and falsely described that which had no existence.

I contend, too, that it can never be admitted that a writer's statements are invalidated in the least degree by the silence of any persons he refers to. The writer cannot force these persons forward in his defence, and many reasons may exist, too deep for the world to penetrate, and too powerful to allow the parties to act with perfect candour,

towards one with whom they may have been placed in disagreeable relations. I speak of course generally, and solely with reference to the hardship of being expected to force forward the testimony referred to.

Throughout his remarks, the writer attaches much more importance to the question of the spear-point being struck or fused, than it in reality deserves; but as he admits, (p. 492, last paragraph) that had it been so struck, the fact would have been "fatal to his pre-conceived opinion as to the course of the lightning on that occasion," I am warranted in adducing some further evidence in support of my statement.

On the morning after the accident, I was invited by Captain Fitzgerald to visit Government House, and offer him suggestions as to the repairs required, and the re-arrangement of the conductors. I went there in the evening and met Mr. Barnes, who shewed me the broken articles, and the course of the explosion. Captain Fitzgerald I now recollect was not present on that occasion. I wrote to Captain Fitzgerald next day, and among other suggestions I especially dwelt on the necessity of replacing the wooden spear by one of metal, connecting this with the copper of the dome, and this lastly by metallic straps, with four additional conductors to be erected adjacent to the dome. Captain Fitzgerald's report, hereunto annexed, shews that my suggestions were carried into effect. On this I have here one remark to make. If this report be correct, if my suggestions have been followed, if the metal spear has been erected, what becomes of your correspondent's assertions that the identical point has been replaced, and that he has re-examined the lower part of the original spear. If, on the other hand, the wooden spear has been replaced as it originally stood, then every impartial electrician will admit,* that the Government House of Calcutta will in all probability be again, and at no distant period, the scene of a similar casualty to that of the 29th of March, 1838. In this case it is in truth provided with a snare for every thunder-cloud that passes.

With reference to my plans, before the writer censures these he should in fairness clearly and fully state what they are. This he does not do, and for such a statement I refer to the Journal of the Asiatic Society for 1839, in which my papers are published. If the Editor

* As Captain Fitzgerald does indirectly in his report.—W. B. O'S.

of the "Calcutta Journal of Natural History," desires to be impartial. I claim from him the circulation of these papers to his subscribers, with additional notes with which I will supply him with pleasure, as *extra limites* to his Journal. All expenses of printing, postage, &c. I will cheerfully defray. His subscribers will then see that I have never opposed the attachment of conductors to Powder Magazines—that I freely admitted their value, but contended that under such peculiar circumstances, they should be erected in a greater number than Mr. Daniell recommended, and at a certain distance from the Magazine.

In conclusion, I have to acknowledge the kind exhortation of your correspondent that I should conduct this discussion with moderation, and that I should refrain from indulging in a spirit of injustice to Mr. M'Clelland and himself. All this is very amiable in gentlemen who are endeavouring to fix upon me an imputation of falsehood, and who would hide from the world, that in consequence of the Griffith and Wallich controversy, and of another public occurrence of some celebrity, I have not for some time had the happiness of being numbered among the friends of my commentators on this occasion. The remembrances of past collisions has never yet mingled honey with a critic's ink, the strongest impulse of nature would, on the contrary, urge him to dip his pen by preference in gall or acid. How far this feeling has operated on the present occasion, those who know the relative positions of the parties can readily conclude; to others I shall commit my arguments and facts, (if Dr. M'Clelland will allow me to do so) in the confidence that they will be dispassionately considered, and in the feeling that if I fail, there is no disgrace in being worsted in a controversy with an antagonist of Mr. Daniell's deserved reputation.

I am Sir, with much respect,

Your obedient servant,

W. B. O'SHAUGHNESSY, M. D.

Assistant Surgeon.

CALCUTTA,
1st March, 1841.

Report by Captain FITZGERALD on the accident by Lightning to Government House, Calcutta.

TO CAPTAIN SANDERS,

No. 563.

Secretary, Military Board.

SIR,

I have the honor to report for the information of the Military Board, that the Government House was struck by lightning during the storm which occurred early this morning. The lightning seems to have been attracted to the building by the iron at the point of the spear attached to the figure of Britannia on the top of the dome; after demolishing the spear, it pursued its course down the external copper of the dome, without apparently doing any injury, and forced its way into the ball room in three separate places. It has left its traces on the ceiling and wall of the southern division of the room, where it has injured one of the pier-glasses, and then passed out at the adjoining window. Again, on the eastern side of the central division it has pursued a similar course, injuring a pier-glass, and again passing out of the adjoining windows. On the western side of the central division it has done the most injury, for after passing through the ceiling it has broken one of the pier-glasses at its corner, then running down into the marble hall, has escaped out of one of the windows, breaking in its exit, as the others also did, several panes of glass.

2nd. I requested Dr. O'Shaughnessy to inspect the effects of the lightning, and he has expressed his surprize that so little comparative injury has been caused by it. The sharp point of iron at the end of the spear, and the studding of the shoulders of the statue with iron nails (intended to prevent birds from sitting on it) has served in the first instance to attract the lightning, and that it has never been struck before, he attributes to the protecting power of the four conductors, which, however, he considers to be twice as far from each other as they ought to be.

3rd. In repairing the statue, he recommends that the spear should be made of metal, and that it should be connected with one or more of the corner conductors by means of a continuous metallic rod. It would perhaps also be advisable, under the circumstances above men-

tioned, to affix four more conductors to the house, to render it more secure from a similar visitation.

4th. With the Board's permission, I will, in rectifying the damage, carry the improvements above suggested into effect.

I have, &c.

(Signed)

W. R. FITZGERALD,

Civil Architect.

FORT WILLIAM,
30th March, 1838.

Memorandum on the Trade between the Towns of Shikarpore and Candahar.—By Lieut. J. POSTANS, Assistant Political Agent, Shikarpore, Sindh.

As it is of importance in connection with the prospects of trade with the countries bordering on, or accessible by means of the river Indus, to ascertain what return commodities may be looked from these quarters, their value and quality as suitable to the European market, I have availed myself of the arrival of the annual Kuffillahs at Shikarpore from Candahar, to obtain the following information on the various articles composing the investments from the latter place, shewing the return trade for English piece goods, metals, groceries, &c. transmitted from the former.

I have ascertained, from good authority, that the market at Candahar for European fabrics of the usual manufactures suitable to the habits and tastes of the people of these countries, is at present unusually brisk, and the demand far greater than the supply; moreover, that there is every reason to believe from the increase of security to the merchant, decrease of transit dues, impulse lately given to Candahar as a mart for the N. W., and the influx of population, that this demand will not be likely materially to decline. To the fabrics in demand, profits derived, and other particulars, I will refer hereafter.

The insecure state of the Bolan Pass, has this year retarded the arrival of the Caravans, and decreased their number. I shall quote the following list of articles received by one:—

No. 1.—*Turquoise Earth*—mds. 14—price from four rupees to twelve rupees per lb. This article is an important one in the trade to

Shikarpore from Candahar, but it is doubtful if it would be adapted to the European market. The mines are situated at Nishapûr near Meshid, and the Persian Government has of late years placed agents to prevent any large or valuable stones from being exported to Herat, whence they find their way to Shikarpore viâ Candahar; there is therefore a great scarcity of the large Turquoises, which are so much prized, the smaller are sufficiently plentiful to be worn by all classes.

The stone is polished from its rough state by means of a vertical wheel of baked clay, set in motion by the hand and moistened, the value of the stone being entirely determined by the depth of its colour, and absence of white flaws.

- 2.—*Raw Silk* (kokanee)— $\frac{1}{2}$ md. price rupees 9-9-0 per lb.

See memorandum already furnished on this article.

- 3.—*Churus* from Bokhara—5 mds.—price 3 annas per lb.

An intoxicating drug prepared from hemp seed (Bang), and used in these countries for the same purposes as opium elsewhere.

- 4.—*Gum* from Candahar—46 mds.—3 lbs. per rupee.

This gum appears of the same description as that which is known as "Gum Arabic," and is in most extensive use for dyeing, &c.

- 5.—*Silk*—Manufactured fabrics from Herat of various kinds—pieces 1854: prices not fixed.

None of these would be adapted for the European Market, being entirely manufactured to suit Asiatic tastes, and principally used in the wealthier Sindee harems.

- 6.—*Dried Fruits* of various kinds, kismis—prunes, dried black grapes, walnuts, dried apricots, almonds, and dates, in great quantities:—prices not quoted, as not probably adapted for trade.

- 7.—*Tinsel Thread for embroidery*.—2 mds.—price 1 anna per tolah.

- 8.—*Khund Seah*, preparation from the sugar cane of Jellalabad— $1\frac{1}{2}$ mds.—price $1\frac{1}{2}$ lbs. per rupee.

- 9.—*Broken Copper and brass vessels*— $4\frac{1}{2}$ mds.—copper 1 rupee 8 annas per lb.—brass 1 rupee 7 annas per lb. These are returned to Shikarpore to be re-manufactured, for which they do not apparently possess the means at Candahar.

- 10.—*Rodung*. Madder dye—40 mds.—price 8 rupees per md. This is an important article in this trade, and brought down in con-

siderable quantities. There are two descriptions called "*Rodung kukree*," and "*Rodung phurreeah*." The latter is cultivated at Candahar, is of a larger size, and valued at 16 rupees per md., or double that of the other.

- 11.—Saffron *Bakooee*— $\frac{1}{2}$ md.—per lb. 15 rupees. "*Bakooee*" so called from its being produced at Bakwa, to the west of Candahar.
- 12.—*Safflower* from Herat (quantity not known) price 37 rupees per lb. about 10 boxes annually, of from 6 to 10 lbs. per box.
- 13.—*Gum Salop* from Herat (quantity not known)—5 Rs. per lb. Small quantities only of this article are brought down, but it is in great request at Shikarpore.
- 14.—*Sir Khisht*, a species of manna, price 5 Rs. per lb; from Herat, used medicinally, and about 10 mds. imported annually.
- 15.—*Musagh*, dye from the walnut tree; Cabool—8 mds— $1\frac{1}{4}$ lb. per rupee.
- 16.—Antimony from Beila in Lus—mds. $15\frac{1}{2}$ —price $1\frac{3}{4}$ lb. per rupee. An article in great demand, from the constant use made of it by the natives of these countries. If adapted to the European Market, it should find its way to Bombay via Soumeany and Karrachee.
- 17.—Old paper $6\frac{1}{2}$ mds.—price 2 lbs. per rupee. Sent to Shikarpore to be re-manufactured.
- 18.—*Punvieer* (not known)—20 mds.—9 lbs. per rupee. Used medicinally, and produced from some wild shrub in the hills.
- 19.—*Podeneh*—dried mint—6 mds.—5 rupees per maund.
- 20.—*Hingoze*—Assafetida—60 mds.— $1\frac{1}{4}$ rupee per lb. This is an important article of this trade, being produced abundantly in Khorassan and the hilly country of Beloochistan.
- 21.—Carraway seeds from Khorassan (quantity not known)—2 lbs. per rupee—about 70 or 80 mds. imported annually.
- 22.—*Airmah*, a very fine description of cotton from Herat, about 80 mds. imported annually—price $1\frac{3}{4}$ rupee per lb.; used in embroidery, and highly prized.
- 23.—*Cochineal* from Khorassan (quantity not known)—price 9 rupees per lb. The amount of annual import may be about 8 or 10 mds., and its price is occasionally from 18 to 20

rupees per lb. ; it is used in dyeing silks, and also brought to Shikarpore from Bombay.

24.—*Bhojgund* (name not known) from Khorassan—price 14 to 15 rupees per md. ; annually about 70 maunds ; in great request, and used as a dye to silks.

25.—*Gooljileel* (name not known) from Khorassan—price 15 rupees per md. ; annually about 80 mds. ; used as a green dye to silks.

The following, though appertaining to Cutchee, are inserted here, as they are products of that *country*, and imported into the Shikarpore market :

26.—*Alum* from the hilly country of Cutchee, annually about 200 mds.—price 8 rupees per md.

27.—*Khunzul*, Colocynth, bitter apple, grows as a perfect weed all over the plains of Cutchee, and to be purchased at Shikarpore 7 or 8 per one pice.

28.—*Saltpetre* can be manufactured in Cutchee and other parts of the country in any quantity required ; value at Shikarpore 6 rupees per md.

29.—*Sulphur* produced in the Murree and Boogtie hills, where are mines which deserve attention ; about 10 or 12 mds., are brought annually to Shikarpore, where it is valued at 4 rupees per md.

30.—*Khar*, a kind of potash, produced by the incineration of the Lye, or tamarisk, and other salt shrubs ; it is in great use in scouring, dyeing, &c. and worth 1 rupee per $1\frac{1}{2}$ md. at Shikarpore, 10 or 12,000 mds. are brought in yearly.

The prices of the above articles include all duties, and few of them are exported beyond Khyrpore, or the Sindh territories. About four Caravans arrive annually, and the profit on this branch of the trade is about 10 per cent.

The trade from Shikarpore to Candahar in British manufactures consists principally of the articles hereafter enumerated, and the present profits, all expences paid, are at least 50 per cent. between the two places, notwithstanding the double rate of Camel hire, (52 rupees) consequent upon the demands of our troops. As the present state of the Candahar market, however, may not be considered a fair criterion, or average of the profits of the trade, I may mention, that these

are never less than from 15 to 20 per cent., the rate of Camel hire being 20 rupees a Camel, carrying from 6 to 7 mds.

I learn that complaints have been lately made of the great inferiority of the articles, particularly the want of stability in the colours of the chintzes (printed cottons of all kinds come under this denomination) always in great demand.

In the following list of the fabrics above alluded to, I have also given the names by which they are known in these countries, with samples of such as are not recognized :—

- 1.—“ *Uwan Mahhootie*,” red dyed Cotton Cloth.
 - 2.—Cotton White.
 - 3.—“ *Kessie*,” partly coloured.
 - 4.—“ *Chuhukwel*,” long cloth (of apparently very inferior descriptions).
 - 5.—“ *Chintz pukhtet*,” (glazed Chintz.)
 - 6.—“ *Budul*,” (printed cottons.)
 - 7.—“ *Madrapat*,” bleached.
 - 8.—“ *unbleached*.”
 - 9.—“ *Abrah*,” (zebra) red and white.
 - 10.—“ *yellow*.”
 - 11.—“ *Chenay*.”
 - 12.—“ *Jamadanee*.”
 - 13.—“ *Mulmul*.”
 - 14.—“ *Juggernat Muslin*.”
 - 15.—“ *Mukhmul*,” (black velvet.)
 - 16.—“ *Patun*,” bleached, species of sheeting cloth.
 - 17.—“ *unbleached*.”
 - 18.—“ *Mahoot*” coloured (coarse broad cloth.)
 - 19.—“ *Khinkaus*.”
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Memorandum on the city of Shikarpoor, in Upper Sindh. By Lieut.

J. POSTANS, Assistant Political Agent, Upper Sindh.

Shikarpore may be considered the most important town in the Shikarpore—its country of Sindh in point of trade, population, and position. influence. It is situated in Upper Sindh, or above Sindh proper, at a distance of twenty-four miles NW. from the Indus at Sukhur, about forty miles from the edge of the desert at Rojhan, which separates Upper Sindh from Cutchee.

Shikarpore dates its origin to the year of the Hijira 1026, (A.D. 1617)

Origin. is an ill built dirty town, its walls in a state of dilapidation and decay, the consequence of the total neglect and apathy of the chiefs of the country to the improvement of their possessions, further shewn in the neglect of the Sindh. A canal flows within a mile of the city towards Larkhana, providing means of irrigation to a large tract of country, and a temporary, but important water communication from the Indus, during a few months of the year.

The houses in Shikarpore are built of unburnt brick, upper roomed, Description of and some of those belonging to the wealthiest the city. Sonears are of respectable size, and convenient. The streets are narrow, confined, and dirty in the extreme; the great Bazar, which is the centre of all trade and banking transactions, for which Shikarpore is celebrated, extends for a distance of 800 yards, running immediately through the centre of the city. It is, in common with the Bazars of all towns in Sindh, protected from the oppressive heat by mats stretched from the houses on either side; this although it imparts an appearance of coolness, occasions by the stagnation of air an insufferable, close, and evidently unwholesome atmosphere, evinced in the sickly appearance of those who pass nearly the whole of their time in the shops and counting houses. This Bazar is generally thronged with people, and though there is little display of merchandize, the place has the air of bustle and importance which it merits. The walls of Shikarpore—also of unburnt brick—have been allowed to remain so totally without repairs that they no longer deserve the name of a protection to the city; they enclose a space of 3831 yards in circumference.

There are eight gates. The suburbs of Shikarpore are very extensive, and a great portion of the population calculated as Suburbs. belonging to the city reside outside, particularly the Mahomedans and labouring classes. With the exception of one tolerable Musjied on the southern side, Shikarpore possesses no building of importance.

By a census taken with considerable care during the preceding month, the following is a return of the inhabitants of this city, including the suburbs:—

HINDOOS.

Males, 9,494 } 18,913 souls. Houses 3,686.
Females, 9,419 }

MAHOMEDANS.

Males, 4,556, } 8,647 souls. Houses 1,806
Females, 4,091 }

In detail thus:—Hindoos divided according to professions—

Hindoos.	Grain sellers,	...	...	...	...	64
	Confectioners,	...	...	...	...	56
	Cotton sellers,	...	...	...	...	12
	Soucars,	...	..	...	...	35
	Shroffs,	...	...	...	...	66
	Cloth merchants,	...	...	...	...	65
	Goldsmiths,	...	...	...	...	94
	Dealers in Drugs,	...	...	...	...	32
	———— Metal,	...	...	...	...	17
	———— Silk,	..	...	...	...	37
	———— Enamel,	...	...	...	...	19
	———— Perfumes,	...	...	.	...	11
	Vegetable and Milk sellers,	...	...	...	...	46
	Dealers in dry fruit,	...	...	...	...	67
	Do. salt and sundries,	...	...	...	...	249
	Ivory turners,	...	...	..	...	3

Total Hindoo Shops, 923*

* The remainder of the Hindoos are composed of Brahmins, and those who are not shopkeepers.

The Mahomedans divided according to trades, &c.—

Mahomedans. Weavers of coarse cloths,	...	...	...	1554
Dyers and washermen,	...	...	...	1248
Oil pressers,	...	...	...	50
Weavers of mats,	...	...	...	30
Tailors,	...	...	...	300
Barbers,	...	...	...	244
Shoemakers and workers in leather,	...	...	...	305
Ironmongers,	...	...	...	290
Embroiderers,	...	...	...	95
Lapidaries,	...	...	...	164
Potters,	...	...	...	103
Cotton cleaners,	...	...	...	121
Butchers,	...	...	...	89
Carpenters,	...	...	...	246
Preparers of woollen mamids,	...	...	...	33
Labourers,	...	...	...	467
Musicians and singers,	...	...	...	267
Cossids,	...	...	...	83
Syuds and Moolahs,	...	...	...	433
Cultivators,	...	...	...	2389
Gardeners,	...	...	...	47

Total, 8,647

Independent of the above, there are altogether 1001 Affghans and

Affghans to Pattans. Pattans in the city of Shikarpore, employed as cultivators, or for Police duties by the Government ;

they are of the following tribes.—Populzyge—2. Pishengee (Syuds) ; 3. Bamkzye ; 4. Moorzye ; 5. Easakzye ; 6. Mogal ; 7. Lukoozye ; 8. Dooranee ; 9. Baber ; 10. Oosteranee ; 11. Monim ; 12. Kakut ; 13. Ghilzee ; 14. Bureeh ; 15. Burdarame ; 16. ——— ; 17. Babee ; 18. Dureanee ; 19. Owan ; 20. Prumee.

It will be seen from the above that the population of Shikarpore may be calculated at 29,700, say 30,000 souls, of whom 9,647, say 10,000, or one-third, are Mahomedans. In the above are also included many Hindoos, who are employed in distant countries as agents from the Soucars.

The Hindoos carry on all the trade, while the cultivation and artizanship of almost every denomination is in the hands of the Mahomedans.

The dress of the Hindoos of Shikarpore varies little from that of the same class in other parts of India, except in those who are servants of the native Governments, as deputies or collectors of revenue, and these invariably adopt the beard of Mahomed and costume of Sindh. On their habits of life and religious observances, the Hindoos of this city, as indeed throughout the whole of the Mahomedan countries westward of the Indus, indulge in a degree of laxity, totally at variance with the strict rules by which they generally profess to be regulated; they possess however an unusual degree of influence at Shikarpore, and are too valuable to the financial resources of the country not to be permitted to maintain it.

With the exception of the Moolahs and Syudhs, few of the Mahomedans of this city are either wealthy or influential.

The Affghan Zamindars who under that rule held important possessions in the vicinity, and were men of note and consideration, have been gradually stripped of their rights by the Talpur chiefs, although in many cases the same were guaranteed to them under promise held to be sacred; in consequence of this their number has considerably decreased, and those who remain are poor, and from the connections they have formed in the country have become naturalized, and are no longer entitled to be called foreigners.

The country in the immediate vicinity of Shikarpore is low, and admits freely of irrigation from the inundations of the river Indus by means of smaller Nullahs, or water courses leading from the Sindh Canal. Cultivation is extensively carried on, and the gardens of Shikarpore are rich in all the fruits peculiar to the country, though mangoes, neim, acacia, pipul, and mulberry trees attain great size. The soil is a rich alluvial, and its capabilities for production are no where better displayed than in the Mogullee district (that in which Shikarpore is situated), owing to the advantages in this respect (possessed by nearly the whole of upper Sindh) being turned to due account, still comparatively speaking only a limited portion of the land is brought under cultivation. Rice and

Juwarree form the great "Kurreef" or autumnal, and wheat the Crops. "Rubbee" or spring crop; the former are entirely dependent on the inundations, which commence to be available for purposes of cultivation about the middle of April, and continue until the middle of September. The "Rubbee" crops are raised by means of wells and bunds formed from the inundation.

The soil is so rich that no manure of any kind is used; the inundations bringing with them a certain slimy matter, which appears highly conducive to fertility, the ground is allowed to remain fallow from the reaping of one crop in October, to the sowing of another in April or May, and the same with the Rubbee lands; this rule appears to obtain all over the country.

Water is found at an average of about twenty feet from the surface, and to a depth of sixty feet the finest description of sand is alone observable; with the alluvial soil is a superstrata; a stone or rocky foundation of any description is not to be seen.

All the approaches to Shikarpore are bad, from the country being so Roads. constantly intersected with water courses, and no measures being taken to provide bridges, or repair the roads, which are cut up by carts, and the constant traffic of camels, bullocks, &c. A comparatively trifling outlay would obviate this, as also improve the Sindh canal. Sindh canal, which, from having been allowed to choak up at its mouth, and get generally into disrepair, is only navigable from the end of April to the beginning of October, whereas it is capable of affording an important means of water communication from the Indus to Shikarpore, for at least nine months of the year.

Shikarpore being in the immediate route for the transmission of Trade and influ- merchandize to Khorassan and countries to the NW. ence of money trans- by the Pass of the Bolan, has with Dera Ghaze actions.

Khan obtained the title of one of the gates of Khorassan. Its influence is more immediately felt however in the banking transactions which by means of agents it carries on in every intermediate place beyond the Bolan Pass, from Quettah and Kelat to Bokhara and Herat; as also in all places of mercantile importance in

Duties and im- India. Vexatious transit and other duties on goods ports on trade. pursuing the Shikarpore route to Khorassan have tended to turn much of its former trade, especially in European goods

received from its port of Karachee, into the channel of communication to the NW. by the way of Soomeanee, Beila, and Kelat, the more direct, and at present by far the less expensive route. A revival of imposts,* together with a settlement of Cutchee, and the suppression of the marauding system in that province and in the Bolan Pass, would revive the trade of Shikarpore, and induce its merchants, who do not want for energy, to purchase largely of such investments as might be cheaply transmitted by means of the river Indus; with the absence of tolls on merchandize in transit, whether by water or land, they would be sure of making a favourable market, coupled also with the protection afforded them through the deserts of Cutchee, which they could only formerly procure at an exorbitant amount of black mail to every leader of a predatory band.

Shikarpore received from Karachee Bunder, Marwar, Mooltan,

Imports. Bhawulpore, Khyrpore, and Loodhiana, European

piece goods, raw silk, ivory, cochineal, spices of all kinds, coarse cotton cloths, raw silk (China), kinkabubs, silks manufactured, sugar-candy, cocoanut, metals, kiramee (or groceries), drugs of sorts, indigo, opium, saffron, and dyes of sorts. From Cutchee, Khorassan, and the NW. raw silk (Toorkestan,) fruits of sorts, madder, turquoises, antimony, medicinal herbs, sulphur, alum, saffron, assafoetida, medicinal herbs and gums, cochineal, and horses.

The exports from Shikarpore are confined to the transmission of goods

Exports. to Khorassan through the Bolan, and a tolerable trade with Cutchee, Bagh, Gundava, Katria, and Dadur.

They consist of indigo (the most important,) henna, metals of all kinds, country, coarse, and fine cloths, European piece goods (chintzes &c.) Mooltanee coarse cloths, silks manufactured, groceries, and spices, raw cotton, coarse sugar, opium, hemp seed, shields, embroidered horse cloths, and dry grains. The various productions of these countries and their prices in the Shikarpore market† have attracted the attention of that energetic body, the Chamber of Commerce of Bombay, and in the article of indigo alone there can be little doubt but that the

* See a list of export, import, and transit duties, based on articles of trade at Shikarpore (by the author) published in the Bombay Government Gazette of the 28th July.

† A monthly price current of articles in the Shikarpore market is now published by authority.

produce of the Khyrpore, Bhawulpore, and the Punjab countries will form a staple return commodity for merchandize to be transmitted from the other Presidency; silk (raw), drugs, and dyes may also be enumerated as well worthy of attention. The influence of the British Government, and the protection it has already afforded to trade in these countries have had their effect at Shikarpore, evinced in the increasing revenue* and settlement there of influential traders from Loodhiana, Amritsir, Bhawulpore, and other places.

The revenue of Shikarpore derivable from trade amounted last year

Revenue from trade	to Rs.	54,736	0	0
and lands.										

Other tax and revenue for lands belonging to the

town,	16,645	0	0
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Making a total of	71,381	0	0
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divided between the Khyrpore and Hyderabad chiefs, in the proportion of $\frac{2}{7}$ ths to the former, and $\frac{4}{7}$ ths to the latter. The lands and villages forming the Shikarpore Pergunnah, amount to about six talookehs, and about sixty villages, of which four talookehs and twenty-three villages only belong to the Hyderabad government; the revenue of the whole, deducting jahgirs, may be about two lacs annually.

The government of the town is vested in two agents, or governors, Government of the town. furnished by the Hyderabad and Khyrpore Ameers, who have also the duty of the Police of the district, and collection of the revenue.

The climate of Shikarpore is sultry, and the heat excessive from the middle of March until the end of August. There are no periodical rains, though storms are generally looked for at the end of June, or middle of July. If rain falls at that time, it continues for a space of two or three days, but severe falls occur at the vernal equinoxes. The air is remarkably dry and clear. The low situation of the town, coupled with its being surrounded by stagnant pools close to the walls, and a large space of the adjacent country for a considerable period

* The soucars report that the trade has increased nearly one-third during the current year.

being completely under water, would warrant a supposition that this place was exceedingly unhealthy; yet it is not so except for a short period from the middle to the end of September, during which the inundations are drying up, and ague in a mild form is prevalent. Exposure to the sun of Sindh, whether Upper or Lower, during the hot months is invariably attended with dangerous effects, and for a certain period of the year the natives themselves avoid it as much as possible. The hot winds of Shikarpore lose much of their intensity, prevailing generally from the southward, and passing over a considerable expanse of water; they continue however during the months of April, May, and June, to blow till midnight. In the deserts N. and W. of Shikarpore, the deadly simoom is often encountered.

The winds vary generally between W. and S. the former the prevailing. The Easterly winds obtain for a short period during the autumnal, and the Westerly during the vernal equinox. The former often precedes rain. Shikarpore is exempted from a great source of annoyance experienced at Sukkur, Hyderabad, and all other places on the banks of the river, from the Delta upwards, viz. sand storms. The cold months may be said to commence in September, and last until the middle of March. Frost and ice are not unusual, and vegetation assumes all the appearance of winter in a northern climate. After a fair experience of a year's residence at Shikarpore, (the season of 1839 being considered an unhealthy one,) I conceive that with the precautions considered necessary elsewhere, of good houses and due attention to draining, troops might be cantoned at this place without any greater disadvantages than are to be met with in most of our stations in the interior of India. When it is considered that the officers and men of a force stationed here during the most trying months of last year were for nearly the whole period under canvas, or in mud huts, that afforded even less shelter than a tent, and that the inundations were allowed to reach in all directions within 200 yards of the camp, it is only surprising that the disease and mortality were so inconsiderable. I believe that out of a force of nearly 2000 men, the latter amounted to under twelve cases. The mornings at Shikarpore are invariably cold.

Routes from Shikarpore to various places with which it carries on

Routes. trade, with the estimated distances.

From Shikarpore to the North and East

To Mooltan, by way of Dehi Ahmil, on the river across the river to

- Azreypore.
- „ Mierpore.
- „ Subzulkote.
- „ Khanepore.
- „ Ooch.
- „ Gullen Garrat, opening of the Ghaut or
Sutledge.
- „ Sooyabad.
- „ Mooltan.

Estimated distances 215 koss; 23 stages for laden camels; occupies from 23 to 26 days.

From Mooltan to Lahore, by way of Chichawntnee, across the Bendee Sheikh Morsa.

- „ Seyud Walloo.
- „ Jambia.
- „ Munjee Baba Narmac Shah.
- „ Surakpore.
- „ Lahore.

Estimated distance from Mooltan to Lahore 140 koss; 15 stages, and occupies with laden camels about 18 days.

To Amristse from Lahore 25 koss; or 2 stages.

From Amristse to Loodihana 40 koss; or 4 stages.

From Shikarpore to Dera-Ghazee-Khan the route is by way of Rogan Mittenkote and Dajil, estimated distance 170 koss; 20 stages, occupies 20 to 23 days.

Shikarpore to Jaysulmere by way of Sukkur and Roree.

- Oodenkote (Oodun ka kila.)
- Dandiolk.
- Gottaroo.
- Chomdred.
- Jaysulmere.

* If these distances are compared with those laid down in the late maps of these countries, it would appear that the koss was calculated at about one and half mile; but the idea of distances by the natives is generally very vague, and they calculate more on the time occupied in a journey.

Estimated distance 100 koss; 15 stages, and occupies from 15 to 18 days. From Jaysulmere to Palee by way of Porwin and Jodhpore 120 koss; 16 stages, and occupies 16 to 19 days.

Shikarpore to the NW. to Dadur.

Janeedera.

Royhan (edge of the desert.)

Brushoree (across the desert.)

Kassimka Joke.

Bagh.

Meyassir.

Dadur.

90 koss; 14 stages, occupying from 7 to 10 days.

The routes above the Bolan Pass to Kelat, Kandahar, Cabool, &c.

Above the Bolan. are now too well known to require repetition.

From Shikarpore to the south to Karachee by way of Sehewan,

Shikarpore to Karachee, Lorkhana, distance 150 koss; 29 stages,
Karachee. occupying from 29 to 33 days; this road is imprac-

ticable from April or May to September as far as Sehewan, and the river is the means of conveying merchandize.

*Classical terminology of Natural History. By B. H. HODGSON, Esq.,
Resident at the Court of Nepal.*

(To the Editor of the Bengal Asiatic Journal.)

SIR,

Although I think the prevalent humour of the day, which cannot tolerate any other than Greek and Roman names of genera in Zoology, is, in good part, absurd and pedantic, yet as I am told that continued non-compliance therewith on my part will be considered by most persons as a sort of excuse for past and future appropriations of my discoveries in this branch of science, as described in your Journal, I have now the pleasure to transmit to you a series of classical substitutes for my previous local designations. Many other new forms having originally received from me classical appellations (for I am no exclusionist) need not be here noticed: of those that were priorly described by local names the following enumeration supplies, on the left hand, the new

classical substitute, and, on the right, opposite thereto, the old vernacular term. A few explanations as well as dates are incorporated with the enumeration.

NEPAL,

February, 1841.

I am, Sir,

Yours faithfully,

B. H. HODGSON.

1. *Muscicapidæ Eurglaiminæ*,

Simus (σιμος) *Raya*

May 1836. *Psarisoma*, Sw. *Crossodera*, Gould, in May and August 1837 respectively.

2. *Meliphagidæ*.

Alcopus (αλκη et πους) *Sibia*

See Jour. As. Society, January 1839.

3. *Falconinæ*,

Hyptiopus (υπτιος et πους) *Baza*

Journal December 1836, et May 1837.

4. *Buccoinæ*,

Comeris (κομη et ρις) *Sasia*

General structure of *Picumnus*, but three-toed, Analogue of *Apternus* et *Chrysonotus* in *Picianæ*.

5. *Sturnidæ Jeterinæ* ? *Ampelidæ Leiotrichanæ* ?

Heterornis (ετερος et ορνις) *Cutia*

Nearly allied to *Aplonis*, a subsequent genus of Gould ; Journal December 1836, and February 1837.

6. *Charadriadæ*.

Pseudops (πсевδος et ωψ) *Carvanaca*

Has the Plover head (and structure generally) with a cultirostral bill.

Journal, December 1836.

7. *Mustelinæ ad finem*.

Mesobema (μεσος et βημα) *Urva*

Closely allied to *Helictis*, which however has Molars $\frac{5}{6}$, and is, in fact, a *Gulo*.

8-10. *Strigidae*, Aberrant group,*Etoglaux* (αετος et γλαυξ) *Huhúa*.

———— Subtypical group.

Mesomorphia (μεσος et μορφη) *Urrua**Meseidus* (μεσος et ειδος) *Bulaca*

Both from their strictly mediate structure between the most typical and most untypical forms. Transac. 1836, Journal, May 1837.

11. *Coccothraustinae*,*Dermophrys* (δερμα et οφρυς) *Munia*.12-13. *Columbidae Vinaginae*,*Rinopus* (ρις et πους) — *Ducula*.

Diagnosis being derived from combination of bill and feet belonging to different types.

Ditto, Ditto,

Romeris (ρομη et ρις) *Toria*.14. *Sylviadae*? *Certhiadae*? *Meliphagidae*?*Polyodon* (πολυς et οδων) *Yuhina*

A strange form. *Andropadus* its analogue among *Brachypods*, whilst it types the Honey-suckers among its own Sylvians.

Crateropodinae.*Decurus* (δεκα et ορη) *Suya*.15. *Saxicolinae*.*Polypeira* (πολυς et πειρα) *Dahila*.

Trans. As. Soc. 1836. This form since styled *Grillioora* by Sw., and *Macrourus* by Gould.

16. *Merulidae Crateropodinae*.*Anura* (αλφα privativa et ορη) *Tesia*

Since called *Micrura* by Gould. Journal Asiatic Society, February 1837.

17. *Ampelinae*,*Prosorinia* (προσω et ρις) *Cochoa*.

A typical ampeline form, though crested and not American, stands between *Ampelis* and *Casmarhynchus*.

18. *Meropidæ*,*Napophila* (ναπος et φυλος) *Bucia*

This, or a very like form, since called *Nyctiornis* by Swainson ;
mine the prior appellation. Journal, June 1836. My bird is, in
no way or degree, a night brid.

19-20. *Saxicolinæ* ?*Chaitaris* (χαιτη et ρις) *Miltava**Dimorpha* (δι et μορφη) *Siphia*

India Review, March 1837.

21. *Parianæ*,*Temnoris* (τεννω seco et ρις) *Suthora*

The tiny stout bill is trincated and square at tip.

22-25. *Leiotrichanæ* ?*Proparus* (quasi *Parus*) *Minla*.*Philacalyx* (φιλος et καλνξ) *Mesia*.*Calipyga* (καλος et πυγη) *Bahila*.

Nearly allied to *Leiathrix* proper.

Hemiparus ($\frac{1}{2}$ Tit) *Siva*.

Indian Review, April and May 1837.

26. *Edolianæ*.*Creurgus* (κρεουργος) *Tenthaca*.

Nearly allied to *Tephrodornis* and *Nylosus*, the last of which
genera is of more recent date than ours.

27-29. *Cometes* (κομητης) *Chibia*.*Melisseus* (Bee-taker) *Bhringa*.*Dicrurus* (Auct) *Bhuchanga*.

Indian Review November 1836, and January 1837.

30. *Buccoidæ* *potius Yunxina*,*Piculus* (diminutive of *Picus*) *Vivia*

Journal, February 1837, nearly allied to *Asthenurus*.

Supplementary Note to the Memoir on the Hodésun, vol. ix. pp. 694 and 783. By Lieutenant TICKELL, *Political Assistant, Singbhoom.*

Through the kindness of Major Wilkinson, Resident at Burra Nagpoor, I am enabled to correct a mis-statement I made in my Memoir on the Ho Dèsum, in which speaking of the "Surrawuks" I described them as Bengallee Brahmins. They are, it appears, not Brahmins, but Jains, or worshippers of *Purusnath*; and are still scattered over several parts of India. In former times there were many of them at a place called Aring in Chutteesgurrh, and some of their temples are there extant to this day.

Major Wilkinson describes the existence in Burra Nagpoor of the remains of a large city in the midst of the jungles on the banks of the Mahanuddee, the name of which was Seirpoor.* It flourished in the time of a race of Rajahs of the "Ho Ho Bunsee" tribe. These were Rajpoots, but the similarity of their name to that of the Koles of the present day ("Ho") is curious.

At Aring, Rajoo, and Dhunteree, Major Wilkinson fell in with several inscriptions on stone, in a character unknown to any persons in that quarter; and I trust he will be enabled to fulfil his present intention of sending some of these inscriptions to the Museum of the Asiatic Society; where there is a probability of their being decyphered, if facsimiles of them be published in this Journal.

NOTE.—I hope to be favoured with the note of a tour recently made by Major Ouseley through his Agency, in which mention is made of the extensive ruins above alluded to, and an interesting statistical account given of a region very little known.



* If I read it aright in his letter.

Proceedings of the Asiatic Society.

(Wednesday Evening, 7th April, 1841.)

The Hon'ble H. T. PRINSEP, Esq., in the Chair.

The following gentlemen proposed at the Meeting of the 5th March last, were balloted for, and duly elected : viz.—

F. BEAUFORT, Esq. C. S.

W. B. JACKSON, Esq. C. S.

W. MASTERS, Esq, Head Teacher, La Martiniere.

The necessary communication of their election, and rules of the Society for guidance, were ordered to be forwarded to the parties.

Library and Museum.

Cautley's Report on the Central Doab Canal, Allahabad Mission Press, 1840 (2 copies),	2
Lardner's Cabinet Cyclopædia—Biography: Lives of the British Admirals, vol. 5th	1
History of the Mohammedan dynasties in Spain, by P. de Gayangos, London, 1840, vol. 1st	1
Sleeman's Report on the Depredations committed by the Thug Gangs of Upper and Central India, from 1836 to 1841, Calcutta, 1840,	1
Madras Journal of Literature and Science, No. 28, July—September, 1840, ..	1
Edinburgh New Philosophical Journal, by Professor Jameson, No. 58, October 1840,	1
London and Edinburgh Philosophical Magazine and Journal of Science, 3rd series, No. 3, November 1840,	1
Yarrell's History of British Birds, pt. 21st, London 1840,	1
Calcutta Monthly Journal and Repository of Intelligence for February 1841, ..	1
Annals and Magazine of Natural History, No. 36, November 1840,	1
Oriental Christian Spectator, February 1841, vol. ii. No. 2, Bombay, ..	1
Lectures on the Religious Practices and Opinions of the Hindus, by H. H. Wilson, Oxford 1840,	1
Proceedings of the Geological Society of London, vol. iii. Nos. 69, 70, 71, for 1840,	1
Bulletin de la Société de Géographie, 2nd Série, Tome 13th, Paris 1840, ..	1
Géographie D'Aboulfeda, Texte Arabe, 2nd Liv. Paris 1840,	2
Nieuwe Proeve omal de Arabische, Letters en verdere schrijfteeke door Het Gewoon Europeesche Karakter onderscheidenlijk uit te drukken, Voor- gesteld door, H. E. Weijers Ze Leyden 1840,	1

The following report was submitted by the Officiating Curator for the month of March last :—

‘H. W. TORRENS, Esq.,

Secretary Asiatic Society.

‘SIR,

‘I have to report for the month of March as follows :—

‘*Geological, Palæontological, and Mineralogical Departments.*—We continue to catalogue and arrange here, at all spare times.

‘The Analytical Index to papers on these subjects in the volumes of the Researches, Gleanings of Science, and Journal up to December 1840 is completed, and in the hands of the printers. By means of it, future Curators and students can refer backwards and forwards to papers or collections with great facility.

‘In the Museum of Economic Geology, the collections in Class II (Iron); Class III (Tin); and Class IV (Copper); are arranged. I annex to this a draft of the plan upon which this part of the Museum should, I think, be arranged; and it will be seen at a glance that this system while it affords every convenience as to distinctness of classification, allows of additions to any extent, without disturbing that which is already done, and of every facility of reference for the student, visitors, and Curator, which are the main requisites in a Museum. The Catalogue to Class III (Tin) is circulated herewith, and I shall be glad to have the opinions and suggestions of Members upon this subject. Class I (Coal) and the other classes are not yet arranged for want of cases.

‘*Mammalogical, Ornithological, Osteological, and Herpetological.*—Nothing new to report beyond the additions noticed below.

‘Additions to the Museum have been as follows :—

- ‘DR. SPRY. { Seven bottles Snakes and Lizards.
 Five ditto water, from various parts of the Bay of Bengal.
 An owl, *Strix*——? Skeleton prepared for the Museum.
- ‘MR. F. M. BOUCHEZ.—A Monkey, *Simnopithecus Entellus*?—Stuffed.
- ‘LIEUT. TICKELL.—Thirty-five Birds’ skins.

‘I am Sir,

‘Your obedient servant,

‘Museum, 31st March, 1841.

‘H. PIDDINGTON,

‘*Officiating Curator, As. Soc. Museum.*’

Plan of proposed Arrangement for the Museum of Economic Geology.

<i>Class.</i>	<i>Division. in Catalogue.</i>	<i>Marks.</i>	<i>Nos.</i>
I. Coal and Anthracites.	A. English	C.	1 to
	B. Indian and Asiatic	I. C.	1 to
	C. Foreign European	E. C.	1 to
	D. American	A. C.	1 to
II. Iron ores, Smelting, &c.	A. English	I.	1 to
	B. Indian and Asiatic	I. I.	1 to
	C. Foreign European	E. I.	1 to
	D. American	A. I.	1 to

III. Tinorea, Flags, Smelting &c.	{	A. English	T.	1 to
		B. Indian and Asiatic	I. T.	
		C. Foreign European	E. T.	
		D. American	A. T.	

and so on, of as many classes as may be required, the marks and numbers being always, where possible, *painted* on the specimens, and the Catalogues printed or lithographed. H. P.

Mr. JAMES DODD, Assay Master of the Agra Bullion Department, having accepted the offer of Rs. 600 for his collection of Minerals, the following correspondence with Mr. Secretary BUSHBY took place:—

‘ To G. A. BUSHBY, Esq.

‘ *Secretary to Government, General Department.*

‘ SIR—With reference to my letters of dates quoted in the margin, I have the honor,
13th Nov. 1840; by direction of the Asiatic Society, to state, that Mr. DODD,
18th Jan. 1841. Assay Master of the Agra Bullion Department, has a valuable collection of minerals, which it is considered highly deserving of purchase, to be placed in the Society’s Rooms for general reference. The collection in question can be had for Rs. 600, and I am requested to submit the solicitation of the Asiatic Society to be authorized to make the purchase, the means being placed at the disposal of the Society, by a grant to that extent by the Government.

ASIATIC SOCIETY’S ROOMS,

‘ I have &c.

‘ 15th March 1841.

‘ H. TORRENS, Sec. Asiatic Soc.

‘ To H. TORRENS, Esq.,

‘ *Secretary to the Asiatic Society.*

‘ *Genl. Dept.*

‘ SIR—I am directed to acknowledge the receipt of your letter dated the 15th instant, and in reply to inform you, that before the Right Honorable the Governor General in Council can decide upon sanctioning the purchase of Mr. DODD’s collection of minerals, it would be satisfactory to His Lordship in Council to receive some general description of the collection in question.

‘ COUNCIL CHAMBER,

‘ I am, Sir,

‘ 24th March, 1841.

‘ Your obedient servant,

‘ G. A. BUSHBY,

‘ *Secretary to the Government of India.*

Ordered—That the Officiating Curator be requested to furnish the general description required, for submission to Government.

Read a letter from Mr. Secretary BUSHBY, of 10th February last, communicating that the Government consider the authority under which the payment of Rs. 300

per mensem is made to the Society for a Curator and the preparation of Specimens, as a sanction and modification of the allowance previously made to it, and not as an independent or additional assignment.

The Secretary brought to notice, for the opinion of the Meeting, the proposal made to him for the support of the Asiatic Society of Bengal for enabling Mons. CALLERY of Macao, to print a Chinese Dictionary, French and English, now compiling by him.

The meeting were of opinion, that as three Dictionaries in the Chinese language were already in the Library of the Society's Museum, it was not expedient to encourage the patronage solicited, but that a few copies of the work after completion might be purchased for the Library and presentation to the learned Societies in Europe, and that a recommendation at the same time should be submitted to the Government for the purchase by them of, say 25 or 30 copies for transmission to the Honorable the Court of Directors for their Library. It was accordingly Resolved—That a communication to the foregoing effect be made to Mons. CALLERY, through Mr. HURRY.

The Secretary also submitted a proposal for printing WILFORD's Manuscript on the Ancient Geography of India to complete the 22d vol. of the Transactions of the Society, which proposal was negatived, on the consideration that though the paper contained much matter to be of interest to the general reader, yet in the opinion of the Society, the time had gone by for its publication ; productions of recent date from other authors on the same subject, containing more correct and valuable information, having superceded the object for which WILFORD wrote, but that the Secretary was at liberty to use the Manuscript as Editor of the Asiatic Journal, by printing extracts of such portions of it as he considered desirable and useful for his object.

Read letter from Mr. Secretary BUSHBY, of 30th December 1840, and enclosures.

' To H. TORRENS, Esq.

' No. 995.

' *Secretary to the Asiatic Society.*

' *General Department.*

' SIR—I am directed by the Right Honorable the Governor General in Council to transmit to you the accompanying copy of letter, No. 17 of 1840, from the Honorable the Court of Directors in the Public Department, dated the 16th September, and to request that the Society will enable the Government to carry into effect the wishes of the Honorable Court in respect to all Zoological and Entomological collections deposited in their Museum on the part of Government, or by persons conducting Missions on the part of the Government, and will assist the Government in giving effect to the commands of the Honorable Court in respect to future supplies to their Museum, as also in regard to the immediate dispatch of Dr. HELFER's and Captain PEMBERTON's Collections in Tenasserim and Bootan.

' I am also directed to transmit a copy of the list of the present contents of the Honorable Court's Museum as far as regards the Mammalia and Birds, that the Society may see the descriptions most desiderated.

' I am at the same time directed to request that the Asiatic Society will furnish this Department with a copy of Dr. HELFER's original list of his Ornithological collections, forwarded to the Secretary to the Society from the Political Department, with Mr. Secretary PRINSEP's letter, dated the 24th October 1838.

' I am, Sir,

' COUNCIL CHAMBER,

' 30th December 1840.

' Your obedient servant,

' G. A. BUSHEY,

' Secretary to Government of India.

' No. 17 of 1840.

' OUR GOVERNOR GENERAL OF INDIA IN COUNCIL.

Public Dept.

' 1st. The first of these letters refers to an application made by MAJOR HAY, through the Asiatic Society of Bengal to you, to purchase a large collection of subjects of Natural History, formed chiefly in southern Africa, and of which you have justly remarked that it would be better adapted to the Museum of Europe than of India, we accordingly approve of your having declined the purchase.

Reply to Paras. 43 and 49
of letter from the Govern-
ment of India, dated 21st
August 1839, No. 26
and
To letter from the Secretary
to the Government of India,
dated 19th January 1839,
No. 2.

2nd. In your letter of the 19th January 1839, you inform us that the collections made by Dr. HELFER in the Tenasserim Provinces have been shipped on the "Madagascar;" a reference to the correspondence accompanying shews that this is not exactly correct. The collections of Dr. HELFER and of Mr. Assistant Surgeon GRIFFITHS, which have been received by the "Madagascar," are exclusively Botanical, and the other collections were deposited with the Asiatic Society.

' 3rd. We take this opportunity of expressing to you more fully our wishes on the subject of collections of Natural History made in India, on account of, or under the patronage, of the Government.

' 4th. In our letter of the 18th September 1839, No. 17, Paras. 81 to 87, we replied to the applications which you made in August 1837, and in September 1838, on behalf of the Asiatic Society of Bengal; and we signified our consent to the monthly payment of 200 or 250 rupees to a qualified person to superintend the Museum, with an allowance of 50 rupees a month for the cost of preparing and preserving specimens besides the former allowance for the publication of Oriental works.

' 5th. We now call your attention to several points respecting the relation in which the Asiatic Society is placed towards the Company's Museum in England in consideration of this grant. It appears from the public correspondence, as well as from the Journal of the Asiatic Society of Bengal, that the collections made by several Deputations and Missions on behalf of Government, which previous to the date of our despatch above mentioned (18th September 1839) were provisionally confided to the care of the Asiatic Society, have been detained in its custody nearly two years, during which period no Zoological collections have been received in our Museum from Bengal.

'6th. We refer here especially to the public letter of Dr. J. W. HELFER to Mr. Secretary PRINSEP, dated Calcutta 16th October 1838, and to a letter from Mr. Secretary PRINSEP, dated Fort William, 24th October 1838, to the Secretary of the Asiatic Society, and to the proceedings of the Asiatic Society of the 5th September, 10th October, and 14th November 1838, published in the Journal of the said Society, also respecting collections made during Captain PEMBERTON's Mission to Bootan, &c. Proceedings of the Asiatic Society of 7th February 1838, Journal p. 90 to 168, 5th September 1838, p. 749.

'7th. It is quite apparent that the detention of subjects of Natural History, in the state in which they are usually brought from Missions or Deputations, the movements of which are necessarily expeditious, must in the climate of India be highly injurious to them, and may in many cases occasion their entire destruction; we notice this particularly with reference to the collections made by Dr. HELFER in Tenasserim, and by Captain PEMBERTON during his Mission to Bootan, since both these are new localities from which no specimens are as yet contained in our Museum.

'8th. In order therefore to guard in future against similar detentions, and to secure an early dispatch of any collections made on behalf of Government to our Museum, we should wish you to require every naturalist or officer who may accompany any Mission or Deputation on behalf of Government, to make at least a provisional report on the nature and extent of his collections immediately on the return of the Mission, to be forwarded to us without delay; further, that whenever practicable, the same officer who accompanied a Mission be instructed on the arrival of his collections to select from his labors the most full and complete series for despatch to England for the Company's Museum by the earliest opportunity, and also to superintend in person the packing and despatch, in order to secure as far as possible the safety of the same during the voyage. In cases in which the collections may have been forwarded to the Presidency before the return of the naturalist by whom they have been made, and when any length of time may be expected to intervene before he can make a selection himself, we are of opinion that it may be expected of the Asiatic Society to make such a selection as is above intimated, and to prepare the same for despatch to England.

'9th. While these instructions apply chiefly to such collections as may be made in future on account of Government, we are likewise desirous that the necessary steps may be taken towards the immediate dispatch to our Museum of a series of the Mammalia and Birds collected by Dr. HELFER in Tenasserim, as far as his collections may have been preserved from the destructive effects of the climate, and of such subjects as may be new to science we desire the supply of several individuals; at the same time we direct that the entire of Dr. HELFER's Entomological collection may be forwarded to us, since from the locality which he visited, many valuable and interesting subjects may be expected in this department particularly; and since no copy of Dr. HELFER's list of his Ornithological collections, which according to a letter from Mr. Secretary PRINSEP, dated Fort William 24th October 1838, was forwarded to the Secretary of the Asiatic Society, has been found in our records, we direct that this list be transmitted to us with all possible expedition. The directions which we have now given respecting Dr. HELFER's collections in Tenasserim, apply also to such collections in Zoology as may have been made during Captain PEMBERTON's Mission on account of Government to Bootan.

' 10. In connexion with these specific instructions, we deem it expedient to add a few general explanatory remarks, the object of which is to secure to our Museum in England, with every proper degree of economy respecting freight and packing expenses, the most valuable and interesting results of scientific Deputations and Missions on behalf of Government; we therefore repeat the recommendation, that on the return of any Mission to Calcutta the naturalist who may have made any collection, or a proper person to be appointed by you, be employed to prepare a single specimen, well preserved, of the more common Mammalia and Birds, such as are well known and described; of those that are rare, and especially of the newly discovered ones, several individuals. To afford the naturalist some assistance in this selection, we will supply a simple list of the present contents of our Museum as far as regards the Mammalia and Birds. By the plan thus recommended we shall become acquainted with the zoological productions of regions newly visited, and thus obtain materials for "Local Faunas," of which several instructive series already exist in our Museum. Of all Entomological collections we require that the entire result of any Deputation on behalf of Government be forwarded to our Museum, since these cannot be preserved in India under the disadvantages of imperfect cabinets, moisture, and general destructive effects of the climate; and being comprised in smaller space, their transmission is not expensive. These instructions will apply to all public collections made previous to the Mission of Dr. HELFER to Tenasserim, should any such be still detained in the hands of individuals, or remain deposited in the Botanic Garden of Calcutta, or in charge of the Asiatic Society.

' We are, &c.

' LONDON.

' 16th September, 1840.

(Signed)

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W. B. BAYLEY,

GEORGE LYALL,

W. ATELL,

H. LINDSAY,

J. L. LUSHINGTON,

JOHN MASTERMAN,

J. W. HOGG,

J. THORNHILL,

N. B. EDMONSTONE,

R. CAMPBELL,

W. WIGRAM,

JOHN SHEPHERD,

F. WARDEN.

(True Copy,)

G. A. BUSHBY,

' Secretary to Government of India.'

List of Mammalia contained in the Museum of the East India Company.

Good Specimens of all QUADRUMANA are Desiderata in the Museum.

ORDO I.—PRIMATES.

TRIBUS QUADRUMANA.

Genus Hylobates,	Illiger.
1 Hylobates syndactylus,	Raffles, Sumatra.
2 ————— Hoolook,	Harl. Assam.
Genus Semnopithecus,	Fr. Cuv.
1 Semnopithecus melalophus,	Sumatra.
2 ————— cristatus,	Raff. id.
3 ————— femoralis,	id.
4 ————— Pyrrhus,	id.
5 ————— maurus,	id.
6 ————— Entellus,	Madras.

GENUS PRESBYTES.

1 Presbytes mitrata, Eschsch,	Voy. Kotzebue.
Semn. ? fascicularis,	Raff. Sumatra.
Semn. comatus,	Desm. Mamm.

GENUS CERCOPITHECUS.

1 Cercopithecus Johnii,	Madras.
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GENUS MACACUS. LACEP.

1 Macacus Sinicus,	Java.
2 ————— cynomolgus,	Linn. Siam.
3 ————— Silenus,	
4 ————— nemestrinus,	Sumatra.
5 ————— Assamensis,	McClelland.

LEMURIDÆ.

* Genus Tarsius,	Storr.
1 Tarsius Bancanus,	Banca.
Genus Nycticebus,	Geoff.
1 Nycticebus Javanicus,	Java.
2 ————— tardigradus,	Siam.

GENUS LEMUR.

1 Lemur ruber,	
* * Galeopithecidæ,	
Genus Galeopithecus,	
1 Galeopithecus variegatus,	Java, &c.

TRIBUS CHEIROPTERA.

Specimens of all CHEIROPTERA are desired, both skins, and especially entire subjects, in Spirits.

Genus Megaderma,	..	..	..	..	..	Geoff.
1 Megaderma Lyra,	..	..	..	..	..	Java.
Genus Rhinolophus,	..	..	..	..	..	Geoff.
1 Rhinolophus affinis,	..	..	..	..	..	Java.
2 ————— minor,	..	..	..	..	..	id.
3 ————— nobilis,	..	..	..	..	..	id.
4 ————— larvatus,	..	..	..	..	..	id.
5 ————— vulgaris,	..	..	..	..	..	id.
6 ————— deformis,	..	..	..	..	..	id.
7 ————— insignis,	..	..	..	..	..	id.
8 ————— Dukhunensis,	..	..	..	..	..	Dukhun.
Genus Nycteris,	..	..	..	..	..	Geoff.
1 Nycteris Javanica,	..	..	..	..	..	Geoff. Java.
Genus Nycticejus,	..	..	..	..	..	Raffinesque.
1 Nycticejus Temmenckii,	..	..	..	..	..	Horsf. Java.

GENUS VESPERTILIO.

1 Vespertilio adversus,	..	..	..	..	..	Horsf. Java.
2 ————— Hardwickii,	..	..	..	..	..	„ id.
3 ————— tralatitius,	..	..	..	..	..	„ id.
4 ————— imbricatus,	..	..	..	..	..	„ id.
5 ————— pictus,	..	..	..	..	..	Linn. id.
Genus Molossus,	..	..	..	..	..	Geoff.
1 Molossus tenuis,	..	..	..	..	..	Java.
———— dilatatus,	..	..	..	..	..	id.
*Genus Cheiromeles,	..	..	..	..	..	Horsf.
1 Cheiromeles torquatus,	..	..	..	..	..	id. Java.

Particularly desirable.

Genus Macroglossus,	..	..	..	..	..	Fr. Cuv.
1 Macroglossus rostratus,	..	..	..	..	..	Java.
2 ————— nanus,	..	..	..	..	..	Siam.

GENUS PTEROPUS.

1 Pteropus edulis.	..	..	..	..	..	Java, &c.
2 ————— Edwardsii, (Medius auctor),	..	..	..	..	..	Dukhun.
3 ————— Assamensis,	..	..	..	..	..	Assam.
4 ————— poliocephalus,	..	..	..	..	..	Siam.
5 ————— marginatus,	..	..	..	..	..	Siam.
1 Pteropus (Pachysoma titthecheilum,	..	..	..	..	..	Java.

ORDO II.—FERÆ.

* Felidæ.

Species of Hyæna: besides the vulgaris, are desirable.	{	Genus Hyæna,	Briss, &c.
		1 Hyæna vulgaris,	Dukhun.

GENUS FELIS.

The smaller species of Felis: several rare species from the Up- per Provinces.	{	1 Felis Tigris,	Linn. Dukhun.
		2 — Leopardus,	Dukhun.
		3 — Pardus,	Java, &c.
		4 — Chaus,	Guldenst, Dukhun.
		5 — Torquata,	Fr. Cuv. id.
		6 — Javanensis,	Java.
		7 — Sumatrana,	Sumatra.
		8 — Bengalensis,	Bengal.
		Genus Prionodon,	Horsf. Linsany, Tem.

Prionodon. 1 Prionodon gracile, Horsf. Java.

? Indian species. Genus Lutra, Lin.

Lutra. { 1 Lutra Leptonyx, Horsf. Java.
2 — Nair, Fr. Cuv. Dukhun.

Genus Mustela, Linn.

Desideratum. 1 Mustela flavigula, Hardwickii, Bengal.

Genus Mangusta, Olivier.

Several new species
are found near the
Himalayas. { 1 Mangusta Javanica, Horsf. Java.
2 — grisea, Herp. gr. Desm. Dukhun.
3 — Pharaonis, Madras.
4 — Auropunctata, Hodgs. Assam.

GENUS VIVERRA.

Viverra: Zibetha, Ci-
vetta, any new species? { 1 Viverra Zibetha, Linn. Sumatra.
2 — Rasse, Horsf. Java, &c.
3 — Indica, Geoff. Dukhun.
4 — Civetta, Siam.

Paradoxurus, seve-
ral Indian species. { Genus Paradoxurus. F. Cuv.
1 Paradoxurus typus, Java, &c.

Genus Arctictis. Actides Valencienna. Temm.

1 Arctictis Binturong, Sumatra.

GENUS CANIS.

The smaller species
of Canis. { 1 Canis familiaris, var. Dukhun.
2 — pallipes, Sykes, id.
3 — aureus, Linn. id.
4 — Kokree, Sykes, id.
5 — rutilans, Temm. Java.

** URSIDÆ.

	Genus Ailurus,	F. Cuv.
<i>Desideratum.</i>	1 Ailurus fulgens,	F. C. Nepaul.
	Genus Prochilus,	Illig.
<i>Prochilus one good specimen.</i>	1 Prochilus ursinus,	Illig. Dukhun.
	Genus Helaretos Ursus aurt.	Horsf.
	1 Helaretos Malayanus,	Horsf. Sumatra.
	Genus Gulo,	Storr.
<i>Gulo.</i>	1 Gulo orientalis,	Horsf. Java.
	Genus Mydaus,	F. Cuv.
	1 Mydaus collaris,	Bengal.
<i>Arctonyx.</i>	Arctonyx collaris,	F. Cuv.
	2 ——— meliceps,	id. Java.

** TALPIDÆ.

	Genus Sorex,	Linn.
<i>Sorex.</i>	1 Sorex Indicus,	Geoff.
	2 ——— Sonerattii,	Geoff.
	**** Genus Tupaia,	Raff.
<i>Tupaia.</i>	1 Tupaia Javanica,	Horsf. Java.
	2 ——— ferruginea,	Raff. Sumatra.

ORDO III. UNGULATA.

	Genus Antelope,	Pallas.
<i>Antelope. The new discovered species from the Himalayas.</i>	1 Antelope picta,	Dukhun.
	2 ——— Bennetti,	Sykes.
	3 ——— Cervicapra,	id.
	4 ——— Hodgsonii,	Bengal.
	5 ——— Thar,	Hodgs. id.
	Genus Moschus,	Linn.
<i>M. moschiferus, Des.</i>	1 Moschus moschiferus,	Nepal.
<i>Common.</i>	2 ——— Javanicus,	Java.
	3 ——— Memima,	Bengal.
	Genus Cervus,	Linn.
<i>Desiderat.</i>	1 Cervus equinus,	Rusa Sumatra.
	2 ——— Duvancelii,	Cuv. Horns. India.
	3 ——— Muntjak,	Java, Dukhun.
	4 ——— porcinus,	Assam.
	Genus Tapirus.	
	1 Tapirus Malayanus.	
	Genus Manis,	Linn.
<i>M. Crassicaudata.</i>	1 Manis Javanica,	Derm. Java.
	2 ——— crassicaudata,	Griff. Dukhun.

ORDO IV. GLIRES.

	Genus Sciurus,	Linn.
<i>All the species of Sciurus are desirable.</i>	1 Sciurus maximus,	Schr. Madras.
	2 ——— Elphinstonii	Sykes, Dukkun.
	3 ——— Leschenaultii,	Derm. Sumatra.
	4 ——— bicolor,	Sparr. Java.
	5 ——— giganteus,	M'Clelland, Assam.
	6 ——— nigrovittatus,	Horsf. Java.
	7 ——— Finlaysonii,	Horsf. Siam.
	8 ——— affinis,	Raff. Sumatra.
	9 ——— tenuis,	Horsf. Siam.
	10 ——— Plantani,	Lyung. Java.
<i>Desiderat.</i>	11 ——— Palmarum,	Briss. Dukkun.
	12 ——— bivittatus,	F. Cuv. Sumatra.
	13 ——— insignis,	F. Cuv. Java.
	14 ——— hippurus,	Geoff. Assam.
	15 ——— Lokriah,	Hodg. id.
	16 ——— Lokrioides,	Hodg. id.
	17 ——— M'Clellandii,	Horsf. id.
	Genus Pteromys,	Geoff.
<i>Desiderat.</i>	1 Pteromys Petaurista,	Desm. Bengal.
	2 ——— nitidus,	Siam.
	3 ——— Diardii,	Java.
	4 ——— genibarbis,	id.
	5 ——— lepidus	id.
	Genus Lepus,	Linn.
<i>Common.</i>	1 Lepus nigricollis,	F. Cuv. Dukkun.
	Genus Hystrix,	Linn.
<i>Desiderat.</i>	1 Hystrix leucurus,	Sykes.
	Genus Mus,	Linn.
<i>Very desirable.</i>	1 Mus giganteus,	Bengal.
	2 ——— setifer,	Horsf. Java.
	3 ——— decumanoides,	Temm. Bengal.
	4 ——— indicus,	Siam.

ORDO V.

FAM. HALICORIDÆ.

GENUS HALICORE.

1 Halicore Dugong,	Raff. Sumatra.
--------------------------	----------------

AVES.

ORDO I. RAPTORES. ILL.

FAM. II. VULTURIDÆ.

SUBFAM. XXX.

Good Specimens of all the Raptores are desiderata, excepting a few of the most common species.

GENUS VULTUR.

1	Vultur Indicus,	..	..	<i>Lath, Dukkun.</i>
2	———— Ponticerianus,	..	..	<i>Lath, id.</i>
3	———— Bengalensis, ..	..	..	<i>Gmel. id.</i>
4	———— leuconotus,	<i>Bengal.</i>

Subfam. xxxxx.

GENUS NEOPHRON, SAV.

1	Neophron Perenopterus,	<i>Dukkun.</i>
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FAM. III. FALCONIDÆ.

Subfam. X. Aquilina.

GENUS PANDION, SAV.

1	Pandion Ichthyætus,	<i>Java.</i>
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GENUS HALIÆTUS, SAV.

Common.

1	Haliætus Ponticerianus,	<i>Java, Sumatra, &c.</i>
2	———— dimidiatus,	<i>Sumatra.</i>
3	———— albicilla,	<i>Raff. Sumatra.</i>
4	———— Macei,	<i>Assam.</i>

GENUS LIMNÆTUS, VIGORS.

1	Limnætus Horsfieldii,	<i>Java.</i>
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GENUS AQUILA.

1	Aquila bifasciata,	<i>Dukkun.</i>
2	———— Vindhiana?			
3	———— pennata,	<i>F. pennata, Briss.</i>

GENUS SPIZÆTUS, VIEILLOT.

1	Spizætus rufinictus, ..	..	..	<i>M^cClelland, Assam.</i>
2	———— cristatellus? ..	..	..	<i>Madras.</i>

GENUS HÆMATORNIS, VIG.

1	Hæmatornis Bacha, ..	..	..	<i>Java, Sumatra.</i>
2	———— undulatus, ..	..	..	<i>Fig. Nipal.</i>

xx. Subfam Accipitrina.

GENUS ACCIPITER.

- | | | | | |
|---|------------------------|----|----|----------------|
| 1 | Accipiter Dukhunensis, | .. | .. | Sykes, Dukhun. |
| 2 | —— fringillarius, | .. | .. | Sumatra. |
| 3 | —— Soloensis, | .. | .. | Horsf. Java. |

GENUS ASTUR AUCT.

- | | | | | |
|---|--------------|----|----|----------------|
| 1 | Astur Hyder, | .. | .. | Sykes, Dukhun. |
|---|--------------|----|----|----------------|

xxx Subfam Falconina.

GENUS HIERAX, VIGORS.

- | | | | | |
|---|---------------------|----|----|-------|
| 1 | Hierax cærulescens, | .. | .. | Java. |
|---|---------------------|----|----|-------|

GENUS FALCO.

- | | | | | |
|---|-------------------|----|-----------------------------|---------------|
| 1 | Falco peregrinus, | .. | .. | Bengal. |
| 2 | —— Tinnunculus, | .. | .. | Java. |
| 3 | —— interstinctus, | .. | M' Clelland, Assam, Madras. | |
| 4 | —— severus, | .. | .. | Horsf. Java. |
| 5 | —— Chiquera, | .. | .. | Lath, Dukhun. |

Good Specimens generally are desiderata.

xxxx. Subfam Buteonina.

GENUS CIRCUS.

- | | | | | |
|---|------------------|----|----|----------------|
| 1 | Circus pallidus, | .. | .. | Sykes, Dukhun. |
| 2 | —— variegatus, | .. | .. | Sykes, Dukhun. |
| 3 | —— melanoleucus, | .. | .. | Assam. |

xxxxx. Subfam Milvina.

GENUS MILVUS.

- | | | | | |
|---|-----------------|----|----|----------------|
| 1 | Milvus Govindo, | .. | .. | Sykes, Dukhun. |
|---|-----------------|----|----|----------------|

GENUS ELANUS, SAV.

- | | | | | |
|---|----------------------|----|----|-----------------|
| 1 | Elanus melanopterus, | .. | .. | Java, Siam, &c. |
|---|----------------------|----|----|-----------------|

FAM: IV. STRIGIDÆ.

x Subfam Nocturnina.

GENUS NOCTUA, SAV.

- | | | | | |
|---|----------------|----|----|----------|
| 1 | Noctua Indica, | .. | .. | Dukhun. |
| 2 | —— hirsuta, | .. | .. | Sumatra. |

xx. Subfam Bubonina.

GENUS KETUPA, LESSON.

- | | | | | |
|---|-----------------------|----|----|-------|
| 1 | Ketupa Leschenaultii, | .. | .. | Siam. |
| 2 | —— Ceylonensis, | .. | .. | Java. |

xxx. Subfam Assionina.

GENUS OTUS, CUV.

1	Otus Bengalensis,	..	..	<i>Frauhl. Dukkun.</i>
2	— Orientalis,	..	..	<i>Horsf. Java.</i>
3	— Lempige,	..	..	<i>Horsf. id.</i>
4	— rufescens,	..	..	<i>Horsf. id.</i>

xxxx.—Subfam Strigidæ.

GENUS STRIX.

1	Strix Javanica,	..	..	<i>Horsf. Java.</i>
2	— badia,	..	..	<i>Horsf. id.</i>
3	— Selo puto,	..	..	<i>Horsf. id.</i>
	Pagodarum,			<i>Temm.</i>
4	— castanoptera,	..	..	<i>Horsf. id.</i>

ORDO II.—INSESSORES.

Tribus, I.—*Fissirostres*.Fam. I.—*Meropidæ*.

GENUS MEROPS, LINN.

<i>Merops—all the Indian species.</i>	1	Merops Javanicus,	..	..	<i>Horsf. Java.</i>
		Savignii,			<i>Temm.</i>
	2	— Adansonii,	..	..	<i>Sumatra.</i>
	3	— urica,	..	..	<i>Horsf. Java.</i>
	4	— viridis,			<i>Linn.</i>

GENUS NYCTIOMIS, SWAINSON.

<i>Particularly.</i>	1	Nyctiomis Athertonii,	<i>Assam.</i>
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Fam: II. Hirunideæ.

GENUS CYPSELUS.

<i>Desiderat.</i>	1	Cypselus comatus,	<i>Siam.</i>
	2	— affinis,			<i>Hard and Gray, Dukkun.</i>
	3	— Klecho,	..	..	<i>Horsf. Java.</i>
		longipennis,			<i>Temm.</i>
	4	— — — — —	..	..	<i>Sumatra.</i>

GENUS HIRUNDO.

<i>Desiderat.</i>	1	Hirundo esculenta,	..	..	<i>Java.</i>
	2	— fuciphaga,	..	..	<i>id.</i>
	3	— filifera,	..	..	<i>Dukkun.</i>
	4	— Sewan,	..	..	<i>Sykes, id.</i>
	5	— concolor,	..	..	<i>Sykes, id.</i>
	6	— erythropygia,	..	..	<i>Sykes, id.</i>
	7	— brevirostris,	..	..	<i>M'Clelland, Assam.</i>
	8	— brevicaudata,	..	..	<i>M'Clelland, id.</i>

Fam: III. Caprimulgidæ.

GENUS CAPRIMULGUS.

<i>Desiderat.</i>	....	{	1	Caprimulgus affinis,	<i>Horsf. Java.</i>
			2	———— macrourus,	<i>Horsf. id.</i>
			3	———— asiaticus,	<i>Madras.</i>
			4	———— monticulus,	<i>Frank, Dukhun.</i>
			5	Caprimulgus Mahrattensis, ..	<i>Sykes, Dukhun.</i>

GENUS PODARGUS.

<i>Podargus, Continental species.</i>	Conti-	{	1	Podargus Javensis,	<i>Horsf. Java.</i>
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Fam. IV. Todidæ.

GENUS EURYLAIMUS, HORSF.

<i>Desiderat.</i>	{	1	Eurylaimus Horsfieldii ..	<i>Temm, Java.</i>
		2	———— ochromalus, ..	<i>Raff. Sumatra.</i>
		3	———— lunatus, ..	<i>Gould, Assam.</i>

GENUS EURYSTOMUS VIEILL (Coloris Cuv.)

<i>Common.</i>		1	Euryetomus Orientalis. ..	<i>Java.</i>
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Fam. V. Halcyonidæ.

GENUS DACELO, LEACH.

<i>Indian species.</i>		1	Dacelo pulchella,	<i>Horsf. Java.</i>
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GENUS HALCYON, SWAINS.

<i>Most of these are common. New species desirable.</i>	{	1	Halcyon leucocephalus, ..	<i>Java.</i>
		2	———— coromandelicus, ..	<i>id.</i>
		3	———— chlorocephalus, ..	<i>id.</i>
		4	———— Sacer,	<i>id.</i>
		5	———— onmicolor,	<i>id.</i>
		6	———— albicapillus, ..	<i>Sumatra.</i>
		7	Smyrnensis,	<i>Dukhun.</i>

GENUS ALCEDO.

<i>Alcedo all the Continental species.</i>	{	1	Alcedorudis,	<i>Linn. Dukhun.</i>
		2	———— Bengalensis, ..	<i>Geml. id.</i>
		3	———— Meninting, ..	<i>Horsf. Java.</i>
		4	———— Biru,	<i>Horsf. id.</i>
		5	———— Guttata,	<i>Gould, Siam, Bengal.</i>

GENUS CEYX.*

		1	Ceyx tridactyla	<i>Java.</i>
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Tribus II. Dentiostres,

Fam. I. Muscipidæ.

GENUS MUSCIPETA.

<i>Common.</i>	{	1	Muscipeta Indica, ..	<i>Stephens, Dukhun.</i>
			2	———— Paradisii, ..	<i>id.</i>

GENUS PHÆNICORNIS, SWAINS.

<i>Desiderata.</i>	....	{	1 <i>Phænicornis flammea</i> ,	..	<i>Java, Assam.</i>
			2 ————— <i>peregrina</i> ,	..	<i>id.</i>
			3 ————— <i>princeps</i>,	.. ..	<i>Gould, Assam.</i>
			4 ————— <i>elegans</i>,	.. ..	<i>M^cClelland, id.</i>
			5 ————— <i>curvirostris</i> ,	..	<i>Assam.</i>
			6 ————— <i>affinis</i> ,	..	<i>Dukhun.</i>

GENUS MUSCICAPA.

<i>Muscicapa generally desirable.</i>	{	1 <i>Muscicapa Indigo</i>,	.. ..	<i>Horsf. Java.</i>
		2 ————— <i>Bangumas</i>,	.. ..	<i>Horsf. id.</i>
		3 ————— <i>obscura</i>,	.. ..	} <i>Horsf. id.</i>
		————— <i>hirundina</i>,	.. ..
		4 ————— <i>melanops</i>,	.. ..	<i>Gould, Dukhun.</i>
		5 ————— <i>Poonensis</i>,	.. ..	<i>Sykes, id.</i>
		6 ————— <i>cæruleocephala</i>,	.. ..	<i>id.</i>
		7 ————— <i>picata</i>,	.. ..	<i>Sykes, id.</i>
		8 ————— <i>capitalis</i>,	.. ..	<i>M^cClelland, Assam.</i>
		9 ————— <i>cærulea</i>,	.. ..	<i>Sumatra.</i>

GENUS RHIPIDURA, VIGORS.

<i>Desiderata.</i>	....	{	1 <i>Rhipidura Javanica</i> ,	..	<i>Java.</i>
			2 ————— <i>fusciventris</i> ,	..	<i>Dukhun.</i>
			3 ————— <i>albipunctata</i> ,		

GENUS CRYPTOLOPHA, SWAINSON.

<i>Cryptolopha—particularly.</i>	{	1 <i>Cryptolopha poiocephala.</i>
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FAM. II. LANIADÆ.

xx. Subfam: Dicrurine, Swains.

<i>Common.</i>	Genus <i>Artamus</i> ,		..	<i>Vieillot. Ocypterus, Cuv.</i>
	1	<i>Artamus leucorhynchus</i> ,	..	<i>Java.</i>
		Genus <i>Diermus</i>,	.. ..	<i>Vieillot.</i>
<i>Common.</i>	{	1 <i>Dicrurus forficatus</i> ,	..	<i>Java.</i>
		2 ————— <i>cinereus</i> ,	..	<i>Horsf. id.</i>
		3 ————— <i>Malabaricus</i> ,	..	<i>id.</i>
		4 ————— <i>Balicassius</i> ,	..	<i>Dukhun.</i>
		5 ————— <i>grandis</i> ,	..	<i>Gould, Assam.</i>
		6 ————— <i>Rangoonensis</i> ,	..	<i>Gould, id.</i>
		7 ————— <i>æneus</i> ,	..	<i>Viell. id.</i>

GENUS TRICOPHORUS. TEMM.

<i>Desiderat.</i>	....	{	1 <i>Tricophorus barbatus</i> ,	..	<i>Java.</i>
			2 ————— <i>flaveolus</i> ,	..	<i>Gould, Assam.</i>

xxx. Subfam. Laniianæ. Swains.

GENUS HYPSPETES, VIGORS.

<i>Desiderat.</i>	....	{	1 <i>Hypsipetes Ganesa</i> ,	..	<i>Sykes, Dukhun.</i>
			2 ————— <i>psaroides</i> ,	..	<i>Gould.</i>
<i>Particularly.</i>	....	{	3 —————		<i>McClellandii, Assam.</i>
			4 ————— <i>gracilis</i> ,	..	<i>id.</i>

GENUS COLLURIO, VIGORS.

<i>Other Continental species desirable.....</i>	{	1 <i>Collurio Bentet</i> ,	..	<i>Horsf. Java.</i>
		2 ————— <i>Hardwickii</i> ,	..	<i>Vig. Dukhun.</i>
		3 ————— <i>erythronotus</i> ,	..	<i>id.</i>
		4 ————— <i>Schach</i> ,	..	<i>id.</i>
		5 ————— <i>Lathora</i> ,	..	<i>id.</i>

GENUS LANIUS, AUCT.

<i>Desiderat.</i>	{	1 <i>Lanius rufus</i> ,	..	<i>Sumatra.</i>
		2 ————— <i>virgatus</i> ,	..	<i>Temm. id.</i>
		3 ————— <i>musciapoides</i> ,	..	<i>Dukhun.</i>
		4 ————— <i>undularis</i> ?	..	<i>Dukhun.</i>

xxxx. Subfam. Thamnophilina.

GENUS VANGA.

1 <i>Vanga coronata</i> ,	..	<i>Vigors, Sumatra.</i>
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xxxxx. Subfam. Cebilepyrinæ, Swains.

GENUS GRAUCALUS, CUV.

<i>Common Desiderat.</i>	{	<i>Graucalus Papuensis</i> ,	..	<i>Java, Dukhun.</i>
		———— <i>maculosus</i> ,		<i>McClelland, Assam.</i>

GENUS CEBILEPYRIS, CUV. CAMPEPHAGA, VIEILL.

<i>Cebilepyris fimbriatus</i> ,	..	<i>Temm. Java, Dukhun.</i>
———— <i>canus</i> ,	..	<i>Dukhun.</i>
———— <i>striga</i> ,	..	<i>Horsf. Java.</i>

FAM III. MERULIDÆ.

x. Subfam Myiotherina, Swains.

GENUS PITTA, TEMM.

All the species of <i>Pitta</i> are <i>Desiderata</i> .	{	1	<i>Pitta cyanura</i> ,	..	<i>Java</i> .
		2	— <i>gigas</i>,	.. ..	<i>Temm. Sumatra</i> .
		3	— <i>thoracina</i>,	.. ..	<i>Temm. Sumatra</i> .
		4	— <i>brachyuara</i> ,	..	<i>Madras</i> .
		5	—	..	<i>Sumatra</i> .

GENUS CINCLUS, BECHST.

<i>Desiderat.</i>	1	<i>Cinclus Asiaticus</i> ,	..	<i>Swains</i> .
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xx. Subfam Merulinae.

GENUS MYOPHONUS, TEMM.

1	<i>Myophonus glaucinus</i> ,	..	<i>Temm. Java</i> .
2	— <i>metallicus</i> ,	..	<i>Java</i> .
3	— <i>Temminckii</i> ,	..	<i>Gould, Bengal</i> .

GENUS CINCLOSOMA, VIG.

<i>Desiderat.</i>	1	<i>Cinclosoma strigatum</i> .
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GENUS TURDUS.

Common.	1	<i>Turdus Saularis</i> ,	..	<i>Dukhun</i> .
		2	— <i>amænus</i> ,	..	<i>Java</i> .
		3	— <i>macrurus</i> ,	..	<i>Java</i> .
		4	— <i>vividis</i> ,	..	<i>Horsf. Java</i> .
		5	— <i>concolor</i> ,	..	<i>Horsf. id.</i>
		6	— <i>vacuis</i> ,	..	<i>Horsf. id.</i>
		7	— <i>ophiocephalus</i> ,	..	<i>id.</i>
		8	— <i>perspicellatus</i> ,	..	<i>Sumatra</i> .
		9	— <i>albicollis</i> ,	..	<i>Royle, Bengal</i> .
		10	— <i>pæcilopterus</i> ,	..	<i>id.</i>
		11	— <i>melanocephalus</i> ,	..	<i>Sumatra</i> .
		12	— <i>cyanotus</i> ,	..	<i>Jard. and Selly, Bengal?</i>
		13	— <i>erythrogaster</i> ,	..	<i>Gould, id.</i>

GENUS IXOS, TEMM.

<i>Desiderat.</i>	.... {	1	<i>Ixos cucullatus</i> ,	<i>Hooded Th. Lath, Bengal</i> .
		2	— <i>melanocephalus</i> ,	<i>Bengal</i> .
		3	— <i>chrysorhæus</i> ,	<i>Java</i> .
<i>Common.</i>	.... {	4	— <i>Cafer</i> , Boolbool,	<i>Dukhun</i> .
		5	— <i>Psidii</i> ,	<i>Java</i> .
		6	— <i>Finlanysonii</i> ,	<i>Sumatra</i> .
		7	— <i>Jocosus</i> ,	<i>Dukhun</i> .

8	<i>Ixos fuscatus</i> ,	..	<i>Dukhun.</i>
9	— <i>bimaculatus</i> ,	..	<i>Java.</i>
10	— <i>dispar</i> ,	..	<i>Java.</i>

GENUS GARRULAX, LESS. IANTHOCIN GLD.

Species of <i>Garrulax</i> , Lesson, or <i>Ianthocini</i> . Gould, are very desir- able.	1	<i>Garrulax gularis</i> ,	..	<i>M'Clelland, Assam.</i>
	2	— <i>pectoralis</i> ,	..	<i>Gould, id.</i>
	3	— <i>lunaris</i>	..	<i>M'Clelland, Assam.</i>
	4	— <i>albogularis</i> ,	..	<i>Gould, Bengal.</i>
	5	— <i>leucolophus</i> ,	..	<i>id.</i>

GENUS GEOCICHLA.

1	<i>Geocichla rubecola</i> ,	..	<i>Bengal.</i>
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GENUS ZOOTHERA, VIGORS.

Rare and very desirable.	1	<i>Zoothera monticola</i> ,	..	<i>Bengal.</i>
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xxx. Subfam Oriolina.

GENUS ORIOIUS, AUCT.

Particularly. {	1	<i>Oriolus Chinensis</i> ,	..	<i>Linn. Java.</i>
	2	— <i>Xanthonotus</i> ,	..	<i>Horsf. Java.</i>
	3	— <i>melanocephalus</i> ,	..	<i>Siam, &c.</i>
	4	— <i>Galbula</i> ,	..	<i>Linn. Dukhun.</i>
	5	— <i>Kundii</i> ,	..	<i>Sykes, Dukhun.</i>
	6	— <i>Traillii</i> ,	..	<i>Gould, Cent., Assam</i>

GENUS IRENA, HORSF.

1	<i>Irena Puella</i> ,	<i>F. Cuv. Puella Lath, Java, Siam.</i>
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xxxx. Subfam Cossyphina.

GENUS TIMALIA, HORSF.

Species of <i>Timalia</i> generally desirable. {	1	<i>Timalia pileata</i> ,	..	<i>Horsf. Java, &c.</i>
	2	— ? <i>gularis</i> ,	..	<i>Horsf. Java.</i>
	3	— <i>Malcolmi</i> ,	..	<i>Sykes, Dukhun.</i>
	4	— <i>Somervillii</i> ,	..	<i>Sykes, id.</i>
	5	— <i>Chatarcea</i> ,	..	<i>Frankl. id.</i>
	6	— <i>hypoleuca</i> ,	..	<i>Frankl. Madras.</i>

xxxxx.

GENUS PETROCINELA, VIGORS.

<i>Desiderata.</i> {	1	<i>Petrocinela Pandu</i> ,	..	<i>Sykes, Dukhun.</i>
	2	— <i>Malab</i> ,	..	<i>Sykes, id.</i>
	3	— <i>cinchlorhyncha</i> ,	..	<i>id.</i>

Fam IV. Sylviadæ.

Subfam x.

GENUS IÖRA, HORSF.

<i>Additional species?</i> {	1	<i>Iöra scapularis</i> ,	..	<i>Java, Siam.</i>
	2	— <i>Typhia</i> ,	..	
	3	— <i>meliceps</i> ,	..	<i>Dukhun.</i>

Subfam xx.

GENUS BRACHYPTERYÆ, HORSF.

- Several India species
of Brachypteryæ, which
have been indicated, are
very desirable.
- | | | | | |
|---|---|-----------------------|----|--------------|
| { | 1 | Brachypteryæ montana, | .. | Horsf. Java. |
| | 2 | ———— ? sepiaria, | .. | id. |

Subfam xxx. Sylviana.

GENUS SYLVIA.

Desiderat.

- | | | | | |
|---|---|------------------|----|----------------|
| { | 1 | Sylvia Javanica, | .. | Prinia, Java. |
| | 2 | ———— montana, | .. | Prinia, Java. |
| | 3 | Sylvia Rama, | .. | Sykes, Dukhun. |
| | 4 | ———— Sylviella, | .. | Sykes, id. |

GENUS PRINIA.

All the Continental
species.

- | | | | | |
|---|---|--------------------|----|----------------|
| { | 1 | Prinia familiaris, | .. | Horsf. Java. |
| | 2 | ———— socialis, | .. | Sykes, Dukhun. |
| | 3 | ———— inornata, | .. | Sykes, id. |

Gen. Zosterops, Vig. and Horsf. see below.

GENUS ORTHOTOMUS, HORSF.

Desiderata.

- | | | | | |
|---|---|--------------------|----|----------------|
| { | 1 | Orthotomus sepium, | .. | Horsf. Java. |
| | 2 | ———— Benetti, | .. | Sykes, Dukhun. |
| | 3 | ———— Lingoo, | .. | Sykes, id. |

xxxx. Subfam Motacillina.

GENUS MOTACILLA, AUCT.

- | | | | |
|---|----------------------|----|-------------------|
| 1 | Motacilla variegata, | .. | Stephens, Dukhun. |
| 2 | ———— Dukhunensis, | .. | Sykes, id. |

GENUS BUDYTES, CUV.

- | | | | |
|---|----------------------------|----|----------------|
| 1 | Budytes flava (Mat flava,) | .. | Java, Sumatra. |
| 2 | ———— citreola (Mat. cit.) | .. | Dukhun. |
| 3 | ———— melanocephala, | .. | Sykes, id. |
| 4 | ———— Beema, | .. | Sykes, id. |

GENUS ENICURUS, TEMM.

Species of Enicurus
desired.

- | | | | | |
|---|---|---------------------|----|----------------|
| { | 1 | Enicurus coronatus, | .. | Temm. Java. |
| | 2 | ———— velatus, | .. | Temm. id. |
| | 3 | ———— maculatus, | .. | Gould, Bengal. |

GENUS ANTHUS, BECHSTEIN.

- | | | | |
|---|----------------|----|----------------|
| 1 | Anthus agilis, | .. | Sykes, Dukhun. |
| 2 | ———— ? | .. | Sumatra. |

GENUS MEGALURUS, HORSF.

- | | | | | |
|---|---|----------------------|----|----------------|
| { | 1 | Megalurus palustris, | .. | Horsf. Java. |
| | 2 | ———— ? ruficeps, | .. | Sykes, Dukhun. |

xxxxx Subfam Saxicolina.

GENUS SAXICOLA, BECHSTEIN.

Desiderata.

- | | | | | |
|---|---|--------------------|----|---------------------------------|
| { | 1 | Saxicola caprata. | .. | Java, &c. |
| | 2 | ———— Rubicola, | .. | Temm. Dukhun. |
| | 3 | ———— Rubicoloides, | .. | Sykes, id. |
| | 4 | ———— bicolor, | .. | Sykes, id. |
| | 5 | ———— erythropgia, | .. | Sykes, id. |
| | 6 | ———— olivea. | .. | M ^c Clelland. Assam. |

GENUS PHENICURA, JARD AND SELBY.

<i>Desiderata.</i>	{	1	<i>Phenicura atrata</i> ,	<i>Jard. and Selby, Dukhun.</i>
		2	———— <i>frontalis</i> ,	<i>Gould. Cent. Bengal.</i>
		3	———— <i>cæruleocephala</i> ,	<i>.. Gould. Cent. id.</i>
		4	———— <i>leucocephala</i> ,	<i>.. Gould. Cent. id.</i>
		5	———— <i>Reevesii</i> ,	<i>.. Gray, Assam.</i>

GENUS ZOSTEROPS, VIGORS AND HORSE.

<i>Additional Continental species ?</i>	{	<i>Zosterops Maderaspatanus</i> ,	<i>..</i>	<i>Java.</i>
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FAM V. PIPRIDÆ.

GENUS PARUS, LINN.

<i>Several other Indian species are indicated.</i>	{	1	<i>Parus atriceps</i> ,	<i>.. Horsf. Java.</i>
		2	———— <i>xanthogenus</i> ,	<i>Vig. Gld. Cent. Dukhun.</i>
		3	———— <i>erythrocephalus</i> ,	<i>Gld. Cent. Bengal.</i>
		4	———— <i>monticolus</i> ,	<i>.. Gld. Cent. id.</i>
		5	———— ————	<i>.. id.</i>

GENUS MELANOCHLORA, LESS. PARUS. LAF. MCCLELLAND.

<i>Genus Melanochlora.</i>	{	1	<i>Melanochlora flavocristata</i> ,	<i>.. Assam.</i>
<i>Particularly.</i>			<i>Parus flavocristatus</i> ,	<i>Lafr.</i>

GENUS CALYPTOMENA, RAFF.

<i>Particularly.</i>	1	<i>Calyptomena viridis</i> .	<i>.. Raffl. Sumatra.</i>
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GENUS LEIOTHRIX, SWAINSON.

<i>Leiothrix is a very interesting Genus and all Indian species are Desiderata.</i>	{	1	<i>Liothrix lepida</i> ,	<i>.. M^cClelland, Assam.</i>
		2	———— <i>signata</i> ,	<i>.. M^cClelland, id.</i>
		3	———— <i>ornata</i> ,	<i>.. M^cClelland, id.</i>

Tribus III. Conirostres, Cuv.

I. FAM. FRINGILLIDÆ.

xx. Subfam Alaudina.

GENUS EMBERIZA, LINN.

<i>Desiderata.</i>	{	1	<i>Emberiza cristata</i> ,	<i>.. Vigors, Dukhun.</i>
		2	———— <i>subcristata</i> ,	<i>.. Sykes, id.</i>
		3	———— <i>malanocephala</i> ,	<i>.. Sykes, id.</i>
		4	———— <i>Cia</i> , ..	<i>.. Bengal.</i>

GENUS ALAUDA, LINN.

	1	<i>Alauda Gulgula</i> ,	<i>.. Frankl. Dukhun.</i>
	2	———— <i>Deva</i> ,	<i>.. Sykes, id.</i>

GENUS LINARIA.

<i>Common.</i>	1	<i>Linaria Amandava</i> ,	<i>.. Java.</i>
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GENUS MIRAFRA, HORSE.

<i>Species of Mirafra desired.</i>	{	1	<i>Mirafra Javanica</i> ,	<i>.. Horsf. Java.</i>
		2	———— <i>phænicura</i> ,	<i>.. Frankl. Dukhun.</i>
		3	———— <i>Assamica</i> ,	<i>.. M^cClelland, Assam.</i>
		4	———— <i>æmelicollis</i> ,	<i>M^cClelland, id.</i>

xxx. Subfam Carduelina.

GENUS CARDUELIS, BRISS.

- | | | | |
|---|-----------------------------|----|-----------------------------|
| 1 | <i>Carduelis caniceps</i> , | .. | <i>Gould, Cent. Bengal.</i> |
| 2 | ———— <i>spinoides</i> , | .. | <i>id. id.</i> |

GENUS PLOCEUS, CUV.

- | | | | |
|---|-------------------------------|----|-------------------|
| 1 | <i>Ploceus Philippensis</i> , | .. | <i>Java.</i> |
| 3 | ———— <i>Mangar</i> , | .. | <i>Horsf. id.</i> |

xxxx. Subfam Passernia.

GENUS FRINGILLA.

- | | | | | | |
|------------|--------|---|--------------------------------|------|---------------------------|
| Desiderat. | { | 1 | <i>Fringilla punctularia</i> , | .. | <i>Lcep. Linn. Java.</i> |
| | | 2 | ———— <i>striata</i> , | .. | <i>LS. Linn. id.</i> |
| | | 3 | ———— <i>oryzivora</i> , | .. | <i>id.</i> |
| | | 4 | ———— <i>Maja</i>, | .... | <i>id.</i> |
| | | 5 | ———— <i>crucigera</i> , | .. | <i>Temm. Dukkun.</i> |
| | | 6 | ———— <i>Rhodopepla</i>, | .... | <i>Gld. Cent. Bengal.</i> |
| | | 7 | ———— <i>montana?</i> | .... | <i>Sumatra.</i> |

GENUS PASSER, AUCT.

- | | | | |
|---|----------------------------|----|-----------------------|
| 1 | <i>Passer domesticus</i> , | .. | <i>Briss. Dukkun.</i> |
|---|----------------------------|----|-----------------------|

GENUS LONCHURA, SYKES.

- | | | | | | |
|------------|--------|---|-----------------------------|----|---------------------------|
| Desiderat. | { | 1 | <i>Lonchura misoria</i> , | .. | <i>Dukkun.</i> |
| | | 2 | ———— <i>Cheet</i> , | .. | <i>Sykes, id.</i> |
| | | 3 | ———— <i>leuconota</i> , | .. | <i>Sykes, id.</i> |
| | | 4 | ———— <i>sphura</i> , | .. | <i>Java.</i> |
| | | 5 | ———— <i>melanocephala</i> , | .. | <i>McClelland, Assam.</i> |

II. FAM STURNIDÆ.

xx. Subfam Sturnina.

GENUS STURNUS, LINN.

- | | | | |
|---|---------------------------|----|---------------|
| 1 | <i>Sturnus vulgaris</i> , | .. | <i>China.</i> |
|---|---------------------------|----|---------------|

GENUS LAMPROTORNIS.

- | | | | | | |
|--------------|--------|---|---------------------------|----|--------------------------|
| Desideratum. | { | 1 | <i>Lamprotornis</i> , | .. | <i>Cantor, Java.</i> |
| | | 2 | ———— <i>spilopterus</i> , | .. | <i>Gld. Cent. Assam.</i> |
| | | 3 | | | |

GENUS PASTOR, TEMM.

Several other species of *Pastor* are indicated and a complete series is very much wanted.

- | | | | | |
|---|---|-----------------------------|----|------------------------------|
| { | 1 | <i>Pastor griseus</i> , | .. | <i>Horsf. Java.</i> |
| | 2 | ———— <i>Mahrattensis</i> , | .. | <i>Sykes, Dukkun.</i> |
| | 3 | ———— <i>capensis</i> , | .. | <i>P. Jalla Horsf. Java.</i> |
| | 4 | ———— <i>tricolor</i> , | .. | <i>Horsf. id.</i> |
| | 5 | ———— <i>tristis</i> , | .. | <i>Gracula Linn. Dukkun.</i> |
| | 6 | ———— <i>roseus</i> , | .. | <i>Temm. Dukkun, &c.</i> |
| | 7 | ———— <i>Pagodarusu</i> , | .. | <i>Temm. id.</i> |
| | 8 | ———— <i>crisatellus</i> , | | |
| | 9 | ———— <i>leucocephalus</i> , | | |

III. FAM CORVIDÆ.

xx. Subfam Corvina.

GENUS PICA, BRISS.

- | | | | |
|----------------|---|--------------------------------|------------------------------------|
| <i>Magpie.</i> | { | 1 <i>Pica erythrorhyncha</i> , | <i>Gml. Linn. China.</i> |
| | | * 2 — <i>caudata</i> , .. | <i>Briss Ray, &c. Sumatra.</i> |

GENUS DENDROCITTA, GOULD.

- | | | | |
|--------------------|---|---------------------------------|----------------------|
| <i>Desiderata.</i> | { | 1 <i>Dendrocitta Sinensis</i> , | |
| | | 2 — <i>yagabunda</i> , | <i>Assam.</i> |
| | | 3 — <i>leucogastra</i> , | <i>Gld. Madras.</i> |
| | | 4 — <i>frontalis</i> , | <i>M'Cld. Assam.</i> |

GENUS KITTA, KUHLE.

- 1
- Kitta venatorius*
- .

GENUS CORVUS, AUCT.

- | | | | |
|----------------------------|---|--------------------------|---------------------|
| <i>Additional species.</i> | { | 1 <i>Corvus Corone</i> , | <i>Sumatra.</i> |
| | | 2 — <i>splendens</i> , | <i>Dukhun.</i> |
| | | 3 — <i>culminatus</i> , | <i>id.</i> |
| | | 4 — <i>Enca</i> , | <i>Horsf. Java.</i> |

xxx. Subfam Coraciina.

GENUS CORACIAS, LINN.

- | | | | |
|----------------|---|----------------------------|------------------------|
| <i>Common.</i> | { | 1 <i>Coracias indica</i> , | <i>Linn. Sumatra.</i> |
| | | 2 — <i>affinis</i> , | <i>McClell. Assam.</i> |

GENUS GRACULA, AUCT. EULABES CUV.

- 1
- Gracula religiosa*
- , ..
- Auct, Java, &c.*

GENUS CRYPTSIRINA, VIEILL.

- 1
- Cryptsirina*
- , ..
- Java.*

GENUS GARRULUS, BRISS.

- | | |
|---------------------------------|---------------------|
| 1 <i>Garrulus lanceolatus</i> , | <i>Gld. China.</i> |
| 2 — <i>bispecularis</i> , | <i>Gld. Bengal.</i> |

GENUS FREGILUS, CORACIA BRISS, GRAY, GM. CUV.

- 1
- Fregilus graculus*
- , ..
- Sumatra.*

IV. FAM BUCERIDÆ.

GENUS BUCEROS.

- | | | | |
|------------------------------------------------------------|---|-------------------------------|----------------------------------|
| <i>Several recently discovered Indian species desired.</i> | { | 1 <i>Buceros Rhinoceros</i> , | <i>Linn. Sumatra.</i> |
| | | 2 — <i>undulatus</i> , | <i>Shaw, Java.</i> |
| | | 3 — <i>Malabaricus</i> , | <i>Lath, id.</i> |
| | | 4 — <i>cavatus</i> ? | <i>Homrai, Hodgson, Sumatra.</i> |
| | | 5 — <i>gingeanus</i> , | <i>Madras, &c.</i> |

V. FAM LOXIADÆ, IGORS.

GENUS PARADOXORNIS, GOULD, PROCEED. ZOOL. SOC.

- | | | |
|----------------------|--------------------------------------|----------------------|
| <i>Particularly.</i> | 1 <i>Paradoxornis flavirostris</i> , | <i>Gould, Assam.</i> |
|----------------------|--------------------------------------|----------------------|

TRIBUS IV.

II. FAM PSITTACIDÆ.

x. Subfam Psittacina.

GENUS PSITTACUS.

<i>All the species of this Genus.</i>	1	Psittacus sulphureus,	..	Sumatra.
	2	— ornatus,	..	Sumatra.

xxxx. Subfam. Palæorniniæ.

GENUS PALÆORNIS, VIGORS.

<i>Species of Palæornis generally desired.</i>	1	Palæornis Pondicerianus,	..	Java, &c.
	2	— torquatus,	....	Sumatra.
	3	— flavitorquis,	..	Shaw.
	4	— Malaccensis,	..	Java.
	5	— melanorhynchus,	..	Sykes, Dukhun.
	6	— schisticeps,	..	Bengal.
	7	— erythiocephalus,	..	China.

xxxxx. Subfam Psittaculina, Vigors.

GENUS PSITTACULA, KÜHL.

<i>Additional species.</i>	1	Psittacula Galguila,	..	Java.
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III. FAM PICIDÆ.

GENUS BUCCO.

<i>Additional species desirable?</i>	1	Bucco Javensis,	..	Horsf. Java.
	2	— roseicollis,	..	id.
	3	— Philippensis,	..	
	4	— australis,	..	Horsf.
	5	— versicolor,	..	Raff. Sumatra.
	6	— de Mainas,	..	Temm. Sumatra.
	7	— Lathamii,	..	id.
	8	— caniceps,	..	Dukhun.
	9	— corvinus,	..	id.
	10	— grandis,	..	Sumatra.
	11	— cyanops,	..	Cuv. Assam.

GENUS PICUS.

<i>A complete series of the Continental species of Picus desirable.</i>	1	Picus leucogaster,	..	Temm. Java.
	2	— pulverulentus,	..	Temm. id.
	3	— dimideatus,	..	Temm. id.
	4	— Goensis,	..	Lath. id.
	5	— miniatus,	..	Gmel. id.
	6	— puniceus,	..	Horsf. id.
	7	— analis,	..	Temm. id.
	8	— poicilolophus,	..	Temm. id.
	9	— badius,	..	Raff. Sumatra.
	10	— Mahrattensis,	..	Lath. Dukhun.
	11	— nuchalis,	..	Wagler, Bengal.
	12	— squamatus,	..	Gould, Bengal.
	13	— hyperythrus,	..	Gould, Bengal.
	14	— brunifrons,	..	Gould, Bengal.
	15	— Himalayanus,	..	Jardin, Bengal.
	16	— strenuus,	..	Gould, Assam.
	17	— occipitalis,	..	Gould, Cent. id.
	18	— Nepalensis,	..	Gray and Hard. id.
	19	— Macei,	..	id.

Pedibus Tridactylis.

GENUS CHRYSONOTUS, SWAINS.

<i>Additional species?</i>	{	1 Picus Chrysonotus,	..	<i>Grant, Assam.</i>
		2 ——— tigma,	..	<i>Horsf. Java.</i>

GENUS YUNX, LINN.

1 Yunx torquilla,	..	<i>Linn. Assam, &c.</i>
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IV. FAM CERTHIADÆ.

GENUS UPUPA, AUCT.

Upupa minor,	..	<i>Shaw, Dukhun.</i>
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GENUS TICHODROMA.

1 Tichodroma erythroptera,	..	<i>China.</i>
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GENUS SITTA, LINN.

<i>Other species of Sitta are recorded.</i>	1 Sitta frontalis,	..	<i>Horsf. Java.</i>
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V. FAM. CUCULIDÆ.

GENUS COCCYZUS, VIEILL.

<i>Desideratum.</i>	1 Coccyzus chrysogaster,	..	<i>Java.</i>
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GENUS LEPTOSOMUS.

1 Leptosomus Afer,	..	<i>Dukhun.</i>
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GENUS ENDYNAMIS, VIG. AND HORSF.

1 Endynamis orientalis,	..	<i>Java, &c.</i>
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GENUS CUCULUS, AUCT.

<i>All the Indian species.</i>	{	1 Cuculus fugax,	..	<i>Horsf. Java, &c.</i>
		2 ——— flavus,	..	<i>Gmel. id.</i>
		3 ——— canorus,	..	<i>id.</i>
		4 ——— Pravata,	..	<i>Linn. id.</i>
		5 ——— lugubris,	..	<i>Horsf. id.</i>
		6 ——— xanthorhynchus,	..	<i>Horsf. id.</i>
		7 ——— basalis,	..	<i>Horsf. id.</i>
		8 ——— Nepalensis,	..	<i>Gould, Bengal.</i>
		9 ——— Indicus,	..	

GENUS CENTROPUS, ILLIG.

<i>Centropus and Phæ- nicophaus.</i>	{	1 Centropus lepidus,	..	<i>Horsf. Java, Assam.</i>
		2 ——— Philippensis,	..	<i>Cuv. id. id.</i>

GENUS PHENICOPHAUS, VIEILL.

1 Phenicophaus Rouverdin,	..	<i>Java.</i>
2 ——— lucidus,	..	<i>Vig. Sumatra.</i>
3 ——— tristis,	..	<i>Lesson, Assam.</i>

GENUS TROGON, LINN.

<i>Desideratum.</i>	{	1 Trogon Duvancelii,	..	<i>Temm. Sumatra.</i>
		2 ——— Hodgsonii,	..	<i>Gould, Assam.</i>

Tribus Tenuirostres, Cuv. Fam. Cinnnyridæ.

GENUS CINNYRIS, CUV. NECTARRINA ILLIG.

Indian species generally.	{	1	Cinnnyris lepida,	..	Java, &c.
		2	pectoralis,	..	Horsf. Java.
		3	eximia,	..	Horsf. id.
		4	currucaria,	..	Linn. Dukhun.
		5	Vigorsii,	..	Sykes, id.
		6	minima,	..	Sykes, id.
		7	Mahrattensis,	..	Shaw, id.
		8	concolor,	..	Sykes, id.
		9	Peronii,	..	Siam.
		10	Assamensis,	..	M ^c Clelland, Assam.
		11	Labecula,	..	M ^c Clelland, id.

GENUS ARACHNOTHERA, TEMM.

Desiderata.	....	{	1	Arachnothera inornata,	..	Temm. Java.
			2	longirostria,	..	id.

GENUS DICEÛS, CUV.

Desiderata.	....	{	1	Dicæum cruentatum,	..	Java.
			2	erythronotum,	..	Assam.

FAM. MELIPHUGIDÆ.

GENUS CHLOROPSIS.

Desiderata.	....	{	2	Chloropsis Cochinchinensis,	..	Java, &c.
			2	chrysogaster,	..	M ^c Clelland, Assam.

GENUS POMATORHINUS, HORSF.

Desiderata.	....	{	1	Pomatorhinus montanus,	..	Horsf. Java, Assam.
			2	Horsfieldii,	..	Sykes, Dukhun.
			3	erythrogyns,	..	Gould, Bengal.

ORDO III.—RASORES, ILLIGER.

1 Fam. Columbidae.

GENUS VINAGO, CUV.

1	Vinago veruans,	..	Java, &c.
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GENUS PTILINOPUS, SWAINS.

1	Ptilinopus Elphinstonii,	..	Sykes, Dukhun.
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GENUS COLUMBA, LINN.

Additional species of Arachnotheri Dicæum Chloropsis and Pomatorhinus particularly desirable.	{	1	Columba alba,	Linn. }	Temm. Java.
			Columba titorulis,	.. }	
		2	melanocephala,	..	Gm. id.
		3	tigrina,	..	Temm. id.
		4	risoria,	..	Linn. id.
		5	Bantamensis,	..	Sparm. id.
		6	bitorquata,	..	Temm. id.
		7	Javanica,	..	Temm. id.
		8	Amboinensis,	..	Linn. id.
		9	ænea,	..	Linn. id.
		10	Jamboo,	..	Gmel. Sumatra.
		11	Aleena,	..	Sykes, Dukhun.
		12	humiles,	..	id.
		13	ænas,	..	id.
		14	cambaginus,	..	id.

Species of Vinago, Ptilinopus and Columba are Desirable.

II. FAM PHASIANIDÆ.

GENUS PAVO, LINN.

- | | | | |
|---|-----------------|----|----------------------|
| 1 | Pavo cristatus, | .. | <i>Linn. Dukhun.</i> |
| 2 | — muticus, | .. | <i>Temm. Java.</i> |

GENUS POLYPLECTRON, TEMM.

- | | | | | | |
|---------------------|------|---|----------------------------|----|-----------------|
| <i>Desideratum.</i> | | 1 | Polyplectron bicalcaratus, | .. | <i>Sumatra.</i> |
|---------------------|------|---|----------------------------|----|-----------------|

GENUS LOPHOPHORUS, TEMM.

- | | | | |
|---|------------------------|----|----------------|
| 1 | Lophophorus Impeyanus, | .. | <i>Bengal.</i> |
|---|------------------------|----|----------------|

GENUS GALLUS, BRISS.

- | | | | | | |
|------------------------------|---|---|------------------|----|--------------------|
| <i>Other Indian species?</i> | { | 1 | Gallus furcatus, | .. | <i>Temm. Java.</i> |
| | | 2 | — Bankiva, | .. | <i>Temm. id.</i> |
| | | 3 | — Soneratii, | .. | <i>Dukhun.</i> |
| | | 4 | — giganteus, | .. | <i>id.</i> |
| | | 5 | — domesticus, | .. | <i>id.</i> |

GENUS EUPLOCOMUS.

- | | | | | | | |
|-------------------|------|---|---|------------------------------|----|-----------------------|
| <i>Desiderat.</i> | .... | { | 1 | Euplocamus erythrophthalmus, | .. | <i>Sumatra.</i> |
| | | | 2 | — ignitus, | .. | <i>Temm. Sumatra.</i> |

GENUS PHASIANUS.

- | | | | | | |
|-------------------------------------|---|---|--------------------------|----|---------------|
| <i>All the continental species.</i> | { | 1 | Phasianus albocristatus, | .. | <i>China.</i> |
| | | 2 | — leucomelanos, | .. | <i>Assam.</i> |
| | | 3 | — Pucrasia, | .. | <i>China.</i> |

GENUS ARGUS, TEMM.

- | | | | |
|---|------------------|----|-----------------------|
| 1 | Argus giganteus, | .. | <i>Temm. Sumatra.</i> |
|---|------------------|----|-----------------------|

GENUS TRAGOPAN, CUV.

- | | | | | | |
|----------------------------|----|---|--------------------|----|----------------|
| <i>Additional species.</i> | .. | 1 | Tragopan cornutus, | .. | <i>Bengal.</i> |
|----------------------------|----|---|--------------------|----|----------------|

GENUS NUMIDA.

- | | | | |
|---|-------------------|----|----------------------------|
| 1 | Numida Meleagris, | .. | <i>Domestic in Dukhun.</i> |
|---|-------------------|----|----------------------------|

III. FAM TETRAONIDÆ.

GENUS CRYPTONYX.

- | | | | |
|---|----------------------|----|-----------------|
| 1 | Cryptonyx cristatus, | .. | <i>Sumatra.</i> |
| 2 | — ocellatus, | .. | <i>id.</i> |

GENUS COTURNIX, CUV.

- | | | | | | |
|-----------------------------------------------------------------------|---|---|--------------------|----|-----------------------|
| <i>A complete series of the Genera of this family desirable,</i> | { | 1 | Coturnix sinensis, | .. | <i>Java.</i> |
| | | 2 | — dactylisonans, | .. | <i>Dukhun.</i> |
| | | 3 | — textilis, | .. | <i>id.</i> |
| | | 4 | — Argoondah, | .. | <i>Sykes, Dukhun.</i> |
| | | 5 | — Pentah, | .. | <i>Sykes, id.</i> |
| | | 6 | — erythrorhyncha, | .. | <i>Sykes, id.</i> |

GENUS PERDIX, BRISS.

- | | | | |
|---|------------------|----|--------------------------------|
| 1 | Perdix Javanica, | .. | <i>Horsf. Java.</i> |
| 2 | — personata, | .. | <i>Horsf. id.</i> |
| 3 | — curvirostris, | .. | <i>Sumatra.</i> |
| 4 | — picta, | .. | <i>Jard and Selby, Dukhun.</i> |
| 5 | — oculea, | .. | |
| 6 | — Chukur, | .. | <i>Bengal.</i> |

GENUS FRANCOLINUS.

- | | | | |
|---|------------------------|----|---------|
| 1 | Francolinus spadiceus, | .. | Dukhun. |
| 2 | ———— Pontecerianus, | .. | id. |
| 3 | ———— cruentus, | .. | Bengal. |
| 4 | | | |

GENUS PTEROCLES.

- | | | | |
|---|--------------------------|----|---------------|
| 1 | Pterocles quadricinctus, | .. | Temm. Dukhun. |
| 2 | ———— exustus, | .. | Temm. Dukhun. |

GENUS HEMIPODIUS, TEMM.

- | | | | |
|---|-------------------------|----|------------|
| 1 | Hemipodius Luzoniensis, | .. | Java. |
| 2 | ———— pugnax, | .. | Dukhun. |
| 3 | ———— Dussumier, | .. | Temm. id. |
| 4 | ———— Taigoor, | .. | Sykes, id. |

IV. FAM STRUTHIOMDÆ.

GENUS OTIS, LINN.

- | | | | | |
|---------------------|---|-----------------|----|----------------|
| Desideratum. { | 1 | Otis nigriceps, | .. | Gould, Dukhun. |
| | 2 | — fulva, | .. | Sykes, id. |

ORDO IV. GRALLATOIRES.

I. Fam Gruidæ.

GENUS GRUS, PALLAS.

- | | | | |
|---|---------------|-------|---------|
| 1 | Grus cinerea, | | Bengal. |
|---|---------------|-------|---------|

II. FAM ARDEIDÆ.

GENUS ARDEA.

- | | | | | |
|-----------------------------------------------------------------------|----|----------------|----|---------------------|
| Good specimens of
the Genera Grus, Ardea
and Ciconia desired. { | 1 | Ardea cinerea, | .. | Linn. var. Java. |
| | 2 | — purpurea, | .. | Linn. id. |
| | 3 | — Egretta, | .. | Gmel. Java, Dukhun. |
| | 4 | — Garzetta, | .. | Linn. id. id. |
| | 5 | — russata, | .. | Temm. Java. |
| | 6 | — Malaccensis, | .. | Gmel. id. |
| | 7 | — speciosa, | .. | Horsf. id. |
| | 8 | — Sinensis, | .. | id. |
| | 9 | — flavicollis, | .. | Lath. id. |
| | 10 | — Javanica, | .. | id. |
| | 11 | — cinnamomea, | .. | Gmel. id. |
| | 12 | — Caboga, | .. | Penn. Dukhun. |
| | 13 | — Grayii, | .. | Sykes, id. |
| | 14 | — gularis, | .. | Siam. |

GENUS BOTAURUS, BRISS.

- | | | | |
|---|---------------------|----|---------|
| 1 | Botaurus stellaris, | .. | Bengal. |
|---|---------------------|----|---------|

GENUS NYCTICORAX, STEPHENS.

- | | | | |
|---|----------------------|----|---------------|
| 1 | Nycticorax Europæus, | .. | Java, Dukhun. |
|---|----------------------|----|---------------|

GENUS CICONIA.

- | | | | | |
|--------------------------------------------------------|---|--------------------|----|-------------|
| Ciconia Argala (Adjutant),
a good specimen desired! | 1 | Ciconia capillata, | .. | Temm. Java. |
| | 2 | — lencecephala, | .. | Java. |

GENUS PHENICOPTERUS.

- 1 *Phenicopterus ruber*, .. *Linn. Siam.*

GENUS MYCTERIA, LINN.

- 1 *Mycteria australis*, .. *Bengal.*

GENUS PLATALEA, LINN.

- 1 *Platalea leucorodia*, .. *Linn. Dukkun.*

GENUS ANASTORNUS, ILLIGER.

- 1 *Anastornus typus*, .. *Linn. Dukkun.*

GENUS TANTALUS, LINN.

- 1 *Tantalus leucocephalus*, .. *Lath. Dukkun.*

GENUS IBIS, LACEP.

- 1 *Ibis religiosa*, .. *Cuv. Dukkun.*
 2 — *ignea*, .. *id.*
 3 — *papillosa*, .. *Temm. id.*
 4 — *falcinella*, .. *Temm. id.*

III. FAM SCOLOPACIDÆ.

GENUS NUMENIUS, BRISS.

- Desiderata.* 1 *Numenius Phœopus*, .. *Java.*

GENUS TOTANUS, BECHSTEIN.

- A series of this Genus.* {
 1 *Totanus affinis*, .. *Horsf. Java.*
 2 — *hypoleucos*, .. *Temm. id.*
 3 — *acuminatus*, .. *Horsf. id.*
 4 — *tenurostris*, .. *Horsf. id.*
 5 — *Damacensis*, .. *Horsf. id.*
 6 — *Glottis*, .. *Bechst. id.*
 7 — *ochropus*, .. *Temm. Dukkun.*
 8 — *Glareola*, .. *Temm. id.*

GENUS LIMOSA, BRISS.

- Desiderata.* {
 1 *Limosa melanura*, .. *Java.*
 2 — *Terek*, .. *Temm. id.*
 3 — *Horsfieldii*, .. *Sykes, Dukkun.*
 4 — *Glottoides*, .. *Sykes, id.*
 Totanus Glottoides, } *Gould.*

GENUS SCOLOPAX, LINN.

- 1 *Scolopax saturata*, .. *Horsf. Java.*

GENUS GALLINAGO, RAY.

- Other Indian species of Scolopax and Gallinago.* {
 1 *Gallinago media*, .. *Java, Dukkun.*
 2 — *minima*, .. *Dukkun.*

GENUS RHYNCHÆA, CUV.

- Desideratum.* {
 1 *Rhynchæa orientalis*, .. *Horsf. Java.*
 2 — *pieta*, .. *Gray, Dukkun.*

GENUS PELIDNA, CUV.

- Desideratum.* 1 *Pelidna Temminckii*, .. *Stephens, Dukkun.*

GENUS TRINGA, LINN.

- Desideratum.* 1 *Tringa subarquata*, .. *Temm. Java.*

GENUS SREPSILAS, ILLIGER.

- Desideratum.* 1 *Strepsila collaris*, .. *Temm. Sumatra.*

IV. FAM RALLIDÆ.

GENUS PARRA, LINN.

- 1 *Parra superciliosa*, .. *Horsf. Java.*
2 ——— *Sinensis*, .. *Gmel. Dukhun.*

GENUS GLAREOLA, BRISS.

- Other Continental species.* { 1 *Glareola orientalis*, .. *Leach, Java.*

GENUS RALLUS, LINN.

- Desideratum.* { 1 *Rallus gularis*, .. *Horsf. Java.*
2 ——— *fuceus*, .. *Linn. id.*
3 ——— *A kool*, .. *Sykes, Dukhun.*

GENUS GALLINULA, BRISS.

- Continental species.* { 1 *Gallinula lugubris*, .. *Horsf. Java.*
2 ——— *chloropus*, .. *id.*
3 ——— *Javanica*, .. *Horsf. Java, Dukhun.*
4 ——— *superciliosa*, .. *Temm. Java.*

GENUS PORPHYRIO, BRISS.

- 1 *Porphyrio smaragdinus*, .. *Java, Dukhun.*

GENUS FULICA.

- 1 *Fulica atra*, .. *Linn. Java, Dukhun.*

V. FAM CHARADRIADÆ.

GENUS VANENLUS, BRISS.

- Desiderata.* { 1 *Vanellus melanogaster*, .. *Java.*
2 ——— *tricolor*, .. *Horsf. id.*
3 ——— *Goënsis*, .. *Steph. Dukhun.*
4 ——— *bilobus*, .. *id.*

GENUS CHARADRIUS.

- Indian species generally.* { 1 *Charadrius cantarius*, .. *Lath. Java.*
2 ——— *pluvialis*, .. *Linn. id.*
3 ——— *Asiaticus*, .. *Gmel. id.*
4 ——— *pusillus*, .. *Horsf. id.*
5 ——— *Phillippensis*, .. *Lath. Dukhun.*

GENUS CURSORIUS, LATH.

- 1 *Cursorius Asiaticus*, .. *Lath. Dukhun.*

GENUS HIMANTOPUS, RAY.

- 1 *Himantopus melanopterus*, .. *Java, &c.*

GENUS ÆDICNEMUS, CUV.

- 1 *Ædicnemus crepitans*, .. *Dukhun.*

ORDO V. NATATOIRES.

I Fam Anatidæ, Leach.

GENUS PLECTROPTERUS, LEACH.

- 1 *Plectropterus melanotos*, .. *Dukhun.*

GENUS ANSER, BRISS.

- 1 *Anser Girra*, .. *Dukhun.*

A series of Indian Natatores generally desirable.

GENUS TADORNA, LEACH.

- 1 Tadorna rutila, .. *Steph. Dukhun.*

GENUS ANAS, AUCT.

- 1 Anas strepera, .. *Linn. Dukhun.*

GENUS RHYNCHAPSIS.

- 1 Rhynchapsis viresceus, .. *Dukhun.*

GENUS MARECA.

- 1 Mareca pæcilorhyncha, .. *Steph. Dukhun.*

- 2 ——— fistularis, .. *id.*

- 3 ——— Ardsuro, .. *Sykes, id.*

- 4 ——— Arcuata, .. *Cuv. Java.*

GENUS QUERQUEDULA.

- 1 Querquedula Circia, .. *Dukhun.*

GENUS MERGUS, LINN.

- 1 Mergus Merganser, .. *Bengal.*

II. FAM. COLYMBIDÆ.

GENUS PODICEPS, LATH.

- 1 Podiceps minor, .. *Java.*

- 2 ——— Philippensis, .. *Dukhun.*

III. FAM. ALCADÆ.

GENUS APTENODYTES, FORST.

- 1 Aptenodytes, .. *Southern Ocean.*

IV. FAM. PELECANIDÆ—LEACH.

GENUS PELECANUS.

- 1 Pelecanus onocrotalus, .. *Java.*

- 2 ——— Javanicus, .. *Horsf. id.*

GENUS PHALACROCORAX, BRISS.

- 1 Phalacrocorax Javanicus, .. *Java.*

GENUS SULA, BRISS.

- 1 Sula communis. .. *Siam.*

GENUS TACHYPETES, VIEILL.

- 1 Tachypetes Aquilus, .. *Siam.*

GENUS PHAETON, LINN.

- 1 Phaëton æthereus,

GENUS PLOTUS, LINN.

- 1 Plotus melanogaster, *Gml. Java, Dukhun.*

V. LARIDÆ—LEACH.

GENUS STERNA, LINN.

- 1 Sterna minuta, .. *Linn. Java.*

- 2 ——— Javanica, .. *Horsf. id.*

3	<i>Sterna media</i> ,	..	<i>Horsf. id.</i>
4	—— <i>grisea</i> ,	..	<i>Horsf. id.</i>
5	—— <i>affinis</i> ,	..	<i>Horsf. id.</i>
6	—— <i>acuticauda</i> ,	..	<i>Gray, Dukhun.</i>
7	—— <i>similis</i> ,	..	<i>Gray, Dukhun.</i>
8	—— <i>Seena ?</i>	..	<i>Sykes, Dukhun.</i>

GENUS DIOMEDEA, LINN.

- 1 *Diomedea exulans*.
- 2 ——— *fuliginosa*.

GENUS PROCELLARIA, AUCT.

- 1 *Procellaria Capensis*,
- 1 ——— *æquinoctialis*.

Remarks.

In the preceding list, subjects of which specimens are particularly desirable have been indicated in the margin : of these several specimens will be useful. The more common species have also been indicated, and of these a single specimen, in good condition, especially in an extensive series or to complete a *local Fanna*, will be sufficient. The Court's wishes respecting collections for the Company's Museum have been generally expressed in the public letter ; a few explanatory remarks are now added. The list exhibits a general view of the present contents of the Company's Museum in Mammalia and Birds, and its chief object is to direct Naturalists in India to the discovery of new species, and to the supply of such as are still wanting in the Museum. Respecting Mammalia generally, it may be observed that specimens of all the smaller species in good condition will be desirable ; but the Court particularly recommend a very close and persevering search respecting the family of *Chiroptera* or *Bats*. The list contains only a small number of Indian Bats, and the Court are most anxious to obtain a large addition of subjects of this family to complete that series. Very few of the Bats of Continental India have as yet been collected, and a general, careful, zealous search is strongly requested and recommended.

Of the family of *Quadrumanæ*, a general supply of good specimens will also be desirable, especially of the Genera *Hylobates*, *Semnopithecus*, *Macacus* ; also of the allied Genera *Lemur*, *Tarsius*, and *Galeopithecus*. Among the *Feræ* the smaller species of *Felis*, *Mustela*, *Mangusta*, *Viverra*, *Arctitis* (or *Ictides*), *Canis*, *Ailurus*, *Arctonyx*, &c. are requested ; and of the larger species good specimens only of rare or newly discovered subjects. These remarks also apply to the order of the *Ungulata*, and among these, especially to the Genera *Antelope*, *Moschus*, *Cervus*, &c. Of the order of *Glires* or *Rodentia*, which are generally small, the Court will be glad to receive series as complete as possible of the species of all the genera, namely, *Sciurus*, *Pteromys*, *Lepus*, *Mus*, &c. &c.

Respecting Birds, the Court would direct particular attention to those Genera which are marked in this list. Several of these have only recently been discovered, and they are of great value and interest in science : additional specimens will be very welcome, and also new species of these, or of previously known Genera.

The Officiating Curator having been requested to furnish his Report on the foregoing papers, submitted the following :—

H. W. TORRENS, Esq.

Secretary, Asiatic Society.

SIR,

In obedience to the desire of the Committee of Papers, confirmed by the Society at its meeting of the 5th instant, I have the honour to submit my report on the matters relative to the Museum, forming the subject of the letter of the Honorable the Court of Directors, No. 17 of 1840, under date 16th September, 1840, and that of the Society to the Government of India, General Department, transmitting the former to you, date 31st December 1840. For more distinct explanation, it may be convenient to state what these matters are :—

I.—The relation in which the Society now stands towards the Honorable the Court.

II.—Inquiry for various collections assumed to have been detained at the Society's rooms : especially those of Dr. HELPER and Capt. PEMBERTON.

III.—The assistance which may be afforded by the Society to facilitate the early dispatch of collections made by Government Officers.

IV.—Assistance which may be afforded by the Society towards the completion of the Honorable Court's Museum.

The feeling of the Society, and my own views on this head, are, I submit,

I. The relation in which the Society now stands towards the Honorable the Court.	} fully expressed by the Resolution which I had the honor to propose, and which was unanimously carried at the January meeting of 1841, (see Journal No. 105,

p. 913,) and which for ready reference, I copy here.

"The Officiating Curator reported, that a considerable number of duplicate specimens, principally of birds, &c. were available for transmission to Europe; and he moved,—that as many specimens of great interest to Naturalists might be collected, prepared and sent to England at a small expence, it was worthy the attention of the Society, whether such might not be prepared and sent to the Honorable the Court of Directors, as due to them from the Society."

The Society therein adopting this resolution, has fully testified its earnest desire to acknowledge, in every possible way which can tend to the general advancement of science, the liberal assistance which the Honorable the Court has been pleased to extend to it. I may also here, perhaps, refer to my report for the past month, (approved by the Society), in which, after proposing a second dispatch of duplicates to the Honorable the Court, I have ventured further to suggest to their Curator, how we can mutually assist each other, as follows :—

"I may suggest here, that we point out to the Curator of the Museum of the Honorable the Court of Directors the great facility with which, if approved of by the Court, he might procure in exchange for such specimens as he already possesses, some of the many which we require for the Museum of Economic Geology. It is scarcely possible to send home a skin of a bird, a skeleton, or a skull from India, for which some duplicate may not be obtained in exchange, which would be of utility to us here."

II.—Inquiry for various collections supposed to have been detained at the Society's Rooms, especially those of Dr. HELFER and Capt. PEMBERTON.

My report on Dr. HELFER's collection will I trust have satisfactorily shewn that, with respect to them, the Society is exonerated from all blame. I omitted in it to refer to the Entomological part. On careful inquiry, I find that no collection of insects was, at any time, deposited at the Society's Rooms by Dr. HELFER. Specimens of the moth cocoon, &c. of the Assam silk worms, were only presented by him to illustrate his paper on that subject.

With reference to Capt. PEMBERTON's collection, you will not fail to remark, that the collections referred to in those passages of the proceedings quoted in the Honourable the Court's letter, are collections placed "*in deposit*" only, and consequently, I shall infer, held by the Society at the disposition of the depositor, who evidently by his letter, at p. 749 of the Journal, is there disposing of them; since he says, that "under instructions from Government he presents to the Society 145 specimens of birds, a selection from the Bootan collection, &c."

Further: The collections deposited by Captain PEMBERTON were packed at the Museum, and in February 1840 sent to the Marine Board, for shipment to England, in four cases. Upon reference to Mr. GREENLAW, who has kindly referred to the agents of the *Shepherdess*, the vessel on which the cases were shipped, I learn that she did not arrive in England till the month of December; the Honourable Court's letter, it will be observed, bears date the 16th September 1840.

This is what I have been able to ascertain from the assistants and taxidermists at the Museum, and from Capt. PEMBERTON's official letter; in addition to which I may state, that from the description of the assistants, the four cases were about equal to half or three-quarters of a ton of measurement. Mr. GREENLAW has no knowledge of their size, as freight was to be paid at home.

I have referred to Dr. McCLELLAND, who has furnished me with Mr. GREENLAW's receipt, but he has not replied to my official letter, of which copy is hereto annexed. He however informs me in a private note as follows:—

"The duplicates only, as far as I recollect of the Bootan collection, were sent to the Court of Directors. A complete series was kept with the Society, particularly of the insects; the rest I forwarded myself through the Government on the part of the Bootan deputation."

There is some discrepancy here, which I cannot reconcile with Capt. PEMBERTON's letter quoted above; but as my knowledge stops at this point, I must leave it for your consideration.

Of the insects, there are none in the Society's collection noted as from the Bootan deputation. The assistants state, that they have no recollection of any collection having been received at the Museum for the Society as from Capt. PEMBERTON, or from the Bootan deputation; nor can I find any in their book, which however, is not very carefully kept. The insects referred to by Dr. McCLELLAND, may possibly be those which have no donor's names annexed to them in our cases. On my assuming charge of the Museum, I found a tin box of insects in the taxidermists' room, of which they were taking great care, and their account of it was, that Capt. PEMBERTON had brought *two* such boxes to the Museum; one of which they packed, and *he* himself sent it away, for the Court

of Directors; leaving the other under their care as his private property. This box has recently (February) been sent, under your directions, to Mrs. PEMBERTON.

My report of February also mentions, that in that month I had received from Col. MACLEOD two boxes, being Geological Specimens collected by Capt. PEMBERTON on his Bootan Mission; but without any catalogue. On these you will doubtless take the orders of Government. Dr. McCLELLAND in his note mentions the collections of the Assam Deputation. On reference to Dr. WALLICH, he informs me that he has reported on this subject to Government.

My report of February last also states, what had been found to be the sad condition of the three cases forwarded from Umballa by Mr. CLARK, and just received at the Museum, where I had recognised the collection as being that made by Sir ALEXANDER BURNES during his mission to Scinde. You will doubtless take the orders of Government on this collection also. The Society is thus, I trust completely acquitted of any negligence or detention of any collection which has come into its hands of late years.

III.—The assistance which may be afforded by the Society to facilitate the early dispatch of collections made by Government Officers.

It appears from the foregoing statements, that the Society, in the case of Dr. HELFER's and Capt. PEMBERTON's collections have, really in every respect forestalled the wishes of the Honourable Court, by assisting as far as possible in the early dispatch of them. It is unnecessary here to refer again to its resolution, as already quoted at par. 2, when speaking of the relations in which it stands towards the Honourable the Court.

IV.—The assistance which may be afforded by the Society towards the completion of the Court's Museum.

In reference to this matter, the Society has also done itself the honour to forestall in some respect the views of the Right Honourable the Governor General in Council, by its resolution and by our first dispatch of duplicates of birds and snakes, and of Lieut. HUTTON's valuable Geological series from the Himalaya and Spiti Valley. If desired, it might employ a few taxidermists at the expence of Government, who could be sent at a small expence with gentlemen desirous of contributing to the knowledge of Indian Natural History, and under zealous amateurs, many of whom are now deterred by their want of knowledge, or want of time, or the expence, much might doubtless be done.

I may be excused in remarking in conclusion that it is clear that, in relation to the Natural Sciences, as in every thing else, if India had all that she requires from Europe, and Europe all that she wants from India, both must be immeasurably benefited. In nothing then, surely, can a scientific body like the Asiatic Society, be more honourably employed than in promoting even the smallest fraction of such an exchange; and in nothing could it, in its sphere, more effectually confer lasting benefit on India.

I have the honour to be,

Sir,

Your's obediently,

H. PIDDINGTON,

Acting Curator, As. Soc. Museum.

CALCUTTA,
Asiatic Society's Rooms,
18th March, 1841.

Copy of a Letter to Dr. McCLELLAND referred to in the foregoing Report.

DEAR SIR,

A dispatch having been received by the Government of India from the Honourable the Court of Directors, in which, referring to Proceedings of the Asiatic Society for February, September, October, and November, 1838, they state, that it would appear that collections of Natural History have been detained at the Society's Rooms since those epochs, I have been desired to furnish a report thereon.

2. They refer more particularly to Dr. HELFER's and Captain PEMBERTON's collections. Of the first of these, (Dr. HELFER's,) I have been able to render a full account, quite exonerating the Society or its officers from any blame.

3. Of the second: we have in the Proceedings reference to three collections, mostly birds, deposited by Capt. PEMBERTON, and at p. 749, (Journal 1838,) that 145 birds were presented by him "under instructions from Government." It appears, moreover, by the books, that on the 29th February 1840, four cases which the Messrs. BOUCHEZ state to have been packed and marked here for the Honourable the Court, were sent to the Marine Board for shipment, but they have no receipt for them.

4. I am therefore desired to request from you, on the part of the Society, the best information you can afford us as to these, or any other Government collections of Natural History, which may have been received or sent out while you were in charge of the Society's Museum; with any documents or receipts which may enable us to explain to the full satisfaction of Government, what has become of them.

I am Sir, &c.

CALCUTTA,

H. PIDDINGTON,

As. Socy. Rooms, 12th March, 1841.

Actg. Curator, As. Socy. Museum.

No. 806.

To DR. J. McCLELLAND,

Curator, Asiatic Society's Museum.

SIR,

With reference to your letter dated 29th ultimo, I am directed by the Marine Board to inform you of the shipment on the *Shepherdess*, Capt. BIGGAR, of the 4 boxes containing Natural Curiosities for England, to the address of the Honourable the Court of Directors, at the rate of £ 5-5 per ton of 50 cubic feet; freight payable in England on due delivery of the boxes.

I have the honor to be,

Fort William,

Sir,

MARINE BOARD OFFICE,

Your most obedient Servant,

The 5th March, 1840.

C. B. GREENLAW,

Secretary.

Resolved—That Mr. PIDDINGTON's report be forwarded to the Government, and that attention be particularly directed to the three points suggested in paragraphs 10, 11, and 13, by the Officiating Curator for the consideration of Government, and more particularly for the employment of taxidermists at its expence to accompany gentlemen desirous of contributing to the knowledge of Indian Natural History, but now deterred from doing so, for want of knowledge, or want of time, or the expence.

Read the following letter of 24th March last from Mr. Secretary BUSHBY :—

No. 433.

‘To H. TORRENS, Esq.

‘*Secretary to the Asiatic Society.*

‘*General Department.*

‘Sir,

‘I am directed to acknowledge the receipt of your letter and its enclosure of the 8th instant, and to acquaint you for the information of the Asiatic Society, that the Report of the Officiating Curator of the Society’s Museum on the Specimens brought out by Capt. TREMENEERE, and deposited with the Society for the basis of a Museum of Economic Geology, will be transmitted to the Hon’ble the Court of Directors by the next Overland Mail.

‘2d. I am desired to take this opportunity for forwarding to the Asiatic Society the accompanying three specimens of rock from the head of the Pass at the Gurrah Ghât, near Mhow, on the Bombay and Agra road, together with a copy of the letter from Captain J. H. SMYTH, Officiating Superintendent of the Road, transmitting the specimens to the Military Board.

‘3d. In respect to the Society’s Museum of Economic Geology, the contributions will be obtained gradually by such aids as the Hon’ble the Court of Directors may be enabled to procure, or be pleased to sanction, and by the assistance of private individuals interested in this department of practical science, and by donation or interchanges with other Societies.

‘4th. The influence and correspondence of the Asiatic Society will progressively accomplish these objects.

‘5th. The Military Board will be instructed to direct the attention of the executive Officers of public works and roads, to the purposes of the institution of a Museum of Economic Geology, and to cause collections to be made of specimens, and descriptive lists to be sent to them, from which in communication with the Curator of the Society, the valuable and useful parts will be selected for transmission to the Museum at the least possible expence, and in most cases it is hoped, by a proper arrangement, without any charge in excess of the ordinary carriage that would be employed for other public uses.

‘FORT WILLIAM,

‘24th March, 1841.

‘I have the honor to be,

‘Sir,

‘Your most obedient Servant,

‘G. A. BUSHBY,

‘*Secretary to the Government of Bengal.*

‘No. 143.

‘To MAJOR DE BUDE,

‘*Secretary to the Military Board, Fort William.*

‘SIR,

‘You will receive by Dak banghy, three specimens of the soil at the head of the Pass at Ghurra Ghat, forwarded to me by Captain KELLNER, superintending the road from

Dewass to Ackberpore. No. 1 abounds in detached masses eight feet below the surface; No. 2 in blocks four to six feet in diameter at the surface, and bedded two to three feet in No. 3, which latter is the prevailing stone at the pass, as far as the excavation has as yet been carried.

'I have &c.

(Signed) 'J. W. SMYTH, Captain,
Offg. Supt. of the Agra and Bombay Road.
(True Copy,)

'SHEEPREE }
'16th February, 1841. }

(Signed) 'M. MACLEOD, Captain,
'Assist. Offg. Secy. Military Board.
(True Copy.)

(Signed) 'G. A. BUSHBY,
'Secretary to the Government of Bengal.'

With reference to the three specimens of rock received with the foregoing letter, read the following report from the Officiating Curator of 5th April, 1841, a copy of which was communicated to the Government through Mr. Secretary BUSHBY:—

'H. W. TORRENS, Esq.

'Secretary, Asiatic Society.

'Sir,

'I have to acknowledge receipt of the three specimens of Stone forwarded by Capt. KELLNER, through the Military Board, from the Pass at Ghurra Ghaut, and to say that they are

'* No. 1. Hornblende Slate (or Basaltic Hornblende.)

'No. 2. Argillaceous Sandstone, with veins of mica, having a metallic appearance.

'No. 3. Felspar Prophyry.

'I beg to suggest, that if a good series of specimens through the whole line of road, with a plan and elevation, and as many barometrical elevations of the heights of passes, &c. as possible, could be procured, it would be a great addition to our geological knowledge; as we have but very few sections crossing from the NNE. to the SSW. from the valley of the Ganges towards that of the Nurbudda.

'I further suggest, that a copy of Capt. TREMENHEERE's Memoir be sent to Capt. KELLNER, and indeed to all officers in charge of road-making duties. The specimens are for the present placed in the Museum of Economic Geology.

'MUSEUM,

'5th April, 1841.

'I am, Sir,

'Your obedient servant,

'H. PIDDINGTON,

'Offg. Curator, As. Soc. Museum.

With reference to the 3rd paragraph of Mr. BUSHBY's letter, a question having been suggested as to the proprietorship of the Museum of Economic Geology, the Meeting were of opinion, that as it was not likely that the Government would ever recall it, that the Asiatic Society be considered virtually the proprietor.

* Specimen too small to determine to which variety belonging.

Read the following letter, No. 822, from Mr. Secretary MADDOCK :—

To H. TORRENS, Esq.

No. 822.

Secretary to the Asiatic Society.

Political Department.

SIR,

I am directed by the Governor General in Council to forward to you the accompanying copy of a calculation by Lieut. BIGGE, of the heights of the principal villages visited by him in the Naga Hills, for such notice as the Society may deem it to merit.

I have the honor to be,

Sir,

FORT WILLIAM,
29th March, 1841.

Your most obedient servant,
T. H. MADDOCK,
Secy. to the Govt. of India.

No. 11.

To Captain JENKINS,

Agent to the Gov. Gen. N. E. Frontier.

SIR,

Having by the Dak of yesterday received the Tables necessary to enable me to calculate the approximate height of the various points, which have been taken by Thermometrical observations, I have the honor to forward the same, and am happy to find that they prove nearly correct, when compared with those of yourself and Captain PEMBERTON.

1st. Observation, camp Semoor river below the Prephamah, 2nd February, 1841.

Thermo. in the shade, 48°.

Water boils, 208, approx. height 2,116 feet.

2nd February.

2nd. Observ. at wells on S. E. of village of Prephamah.

Thermo. in shade, 56°.

Water boils, 206, approx. height 3,235 feet.

2nd February.

3rd. Observ. at village of Geroophamah.

Thermo. in shade, 56½°.

Water boils, 204, approx. height 4,340 feet.

3rd February.

1st. Observation at village of Sassamah.

Thermo. in shade, 59°.

Water boils, 204, approx. height 4,362 feet.

4th February, 1841.

1st. Observation camp opposite Ronomah in valley.

Thermo. in shade,..... $48\frac{1}{2}^{\circ}$.

Water boils, 205, approx. height 3,729 feet.

5th February, 1841.

1st. Observation top of the pass to the Jolah river.

Thermo. in shade below the } $46\frac{1}{2}^{\circ}$.
pass on W. side,..... }Ditto, Ditto, at top, $58\frac{1}{2}^{\circ}$.

Water boils, .. 201, approx. height 5,959 feet.

5th February.

2nd. Observation camp on Jalla river.

Thermo. in shade,..... 46° .

Water boils, 203, approx. height 4,729 feet.

6th February.

1st. Observation at pass of Ronomah or Paplongurge.

Thermo. in shade, 56° .Water boils, $201\frac{1}{2}$, approx. height 5,733 feet.

2nd. Observation camp below village.

Thermo. in shade,..... 50° .Water boils, $20\frac{1}{2}$, approx. height 4,283 feet.

7th February.

1st. Observation summit of pass over great range.

Thermo. in shade,..... $47\frac{1}{2}^{\circ}$.Water boils, $201\frac{1}{2}$, approx. height 5,615 feet.

2nd. Observation camp below the pass, N. side.

Thermo. in shade,..... 56° .Water boils, $205\frac{1}{2}$, approx. height 3,513 feet.

3rd. Observation village of Jyramah.

Thermo. in shade,..... $68\frac{1}{2}^{\circ}$.

Water boils, 209, approx. height 1,650 feet.

8th February.

1st. Observation below cane bridge over Kooki river.

Thermo. in shade,..... $58\frac{1}{2}^{\circ}$.

Water boils, 211, approx. height 536 feet.

2nd. Observation summit of Sumigooding.

Thermo. at bottom in shade, $58\frac{1}{2}^{\circ}$.Ditto to top, .. ditto, $70\frac{1}{2}^{\circ}$.Water boils, $207\frac{1}{2}$, approx. height 1,911 feet.

From the last observation it will be seen, as I have not the report of Captain PEMBERTON at hand to refer to the others from, that by my calculations the top of

the village of Sumigooding, stated by that officer from Barometrical observation, to be 196 feet above the level of the sea, is made 49 feet less, a very trifling difference, and one on that account highly satisfactory to me, for the correctness of the others as well as of the instrument, and I hope the same may prove equally so to yourself and Government.

I have, &c. &c.

CAMP SUMEERGODING,
13th February, 1841.

(Signed)

T. BIGGE,
Asst. Agent Gov. Gen.

(True copy,)

(Signed)

F. JENKINS,
Gov. Gen. Agent.

(True copy)

(Signed)

T. H. MADDOCK,
Secy. to Govt. of India.

The Secretary submitted to the inspection of the Meeting several drawings of fishes of the Indus, of the late Dr. LORD's collection.

The Secretary submitted a Sindo Vocabulary by Lieut. EASTWICK. Ordered to be referred to the Committee of Papers.

Dr. H. H. SPRY submitted in the name and on behalf of Capt. JENKINS, Commissioner in Assam, a series of Geological and Mineralogical specimens illustrative of the Grognostic features of the county of Cornwall, with the following note to the Secretary :—

“ This collection, extensive as it is, is only a part of what Capt. JENKINS designs for the Museum ; and it has occurred to him, as well as to myself, that the contribution now made will not be an unacceptable accession to the Museum of Economic Geology, so lately formed through the exertions of Capt. TREMENHEERE.”

Read a letter from Lieut. A. CUNNINGHAM, of Engineers, of 25th March 1841, offering for purchase to add to the cabinet of coins of the Asiatic Society of Bengal sixty-five Roman coins and fifteen Greek coins, sent from the Mediterranean, for Rupees 50.

Lieut. CUNNINGHAM writes, “ amongst the Greek coins are two of Melite, the other being Carthaginian and Greek-Egyptian coins of the Ptolemies. The Roman coins, are of all ages ; several of them being coins of princes of whom the Society's cabinet possesses no specimens, such as Decentius, Lucilla, Faustina, Constantine, with the wolf suckling Romulus and Remus, &c. &c.” Lieut. CUNNINGHAM also offered a series of the Kashmeer coins, twelve coins of twelve Rajahs for 12 rupees, and to collect some few other series of coins which would be interesting and useful.

It was resolved to purchase the coins from Lieut. CUNNINGHAM, and to avail of his services for the collection of other series, the thanks of the Society at the same time being voted to that Officer.

Read a letter from Capt. A. TROYER of Paris, of 15th October 1840, from which the following are extracts :—

“ Whatever the future result of operations in Syria may be, they have prevented the Asiatic Society of Paris to dispatch to Calcutta a box full of Books, among which is the Sanscrit text, and my French translation of the first 6 books of the *Rajatarangini*.

“ We have not yet received the number of your Journal which contains the account of the most interesting discovery you have made on a gem from the Frontier of Seistan, at the ancient Boonaka. It tends greatly to prove the great antiquity of Buddhism, which antiquity seems to gain from day to day.

“ I am now about to complete the English translation of the whole *DABISTAN*, which the late Capt. SHEE had begun, but left unfinished. I intend to have the work printed in Paris for the Translation Fund Committee of London, and hope to have the pleasure of sending you a copy in about a year.

Read Dr. SPRY's note on his tour to the Eastward.

Read letter from Capt. R. SHORTEDE of 22nd March 1841, with a perpetual Time Table constructed by him, by “ the help of which,” says the author, “ may be found in less than half a minute the week, or day of any date for thousands of years, past or future.”

Read a letter from Lieut. POSTANS, dated 21st March 1841 ; containing his report on a certain branch of the Trade of Shikarpore.

Read a letter from Capt. HART of 15th March 1841, containing an account by him of the Brahooses.

It was communicated to the meeting by the Secretary, that the foregoing four papers would be published in early numbers of the Journal by him.

Read a letter from Mr. KINNEY of Bonn, who has been selected by Professor LASSEN to act as Agent for the Society, containing among other matter, the offer of his services in the disposal of the Society's Oriental Publications.

Dr. HEBERLIN was of opinion, that before dispatching the books for sale to Bonn their prices should be reduced, as without such reduction, he was of opinion that it would be useless to send the works, as the Oriental Scholars of Germany would not purchase at prices which he considered to be exorbitant. On this proposal Dr. HEBERLIN was requested to submit a list of the Publications he would suggest to be sent to Bonn for sale, with a scale of reduction in their prices he would recommend, for the consideration of the Committee of Papers.

On the motion also of Dr. HEBERLIN, in consequence of the death of Professor FRANK, who was an Honorary Member of the Asiatic Society of Bengal, that that compliment be paid to Professor EWALD, of Hanover, one of the best Orientalists in Germany. It was resolved—That the Doctor submit, formally, a proposition to this effect, likewise for the consideration of the Committee of Papers.

The Secretary submitted a Doguereotype, presented by Dr. ROUTH, for which, as well as for all other presentations and contributions in Books, Natural subjects, &c. the thanks of the Society were accorded.

On the Mines and Mineral Resources of Northern Afghanistan. By Capt. DRUMMOND, 3rd Light Cavalry, communicated from the Political Department, Government of India.

[Copper Mining district in the Ghilzie territory, South East of Cabool.]

From the valley of Dobundee, which communicates with the plain of Lagur in the direction of Koorrum, to the district of Moosge, about 14 miles south east of Cabool, and again from Moosge to Derbund and Rojan in the direction of Fezeen, is an elevated and rugged mountain tract highly metalliferous.

Geology of the District.—The formations of this mineral district are composed principally of Hornblende rock, and Hornblende Gneiss, Primary Limestone, and Mica Slate. The hornblende rocks are generally speaking of a fissile character, the limestones again are hard, compact, occasionally slaty, and from their feeble effervescence when tried with nitric acid, seem to contain a portion of magnesia, and may accordingly be referred to the dolomite species. The strike or direction of the strata, as may be observed from the sequel, is nearly N. East and S. West, dipping at a considerable inclination to the N. West.

Conforming with the hornblende rocks of Dobundee is a calcareous sandstone formation with subordinate beds of slate clay enclosing their seams of coal. This sandstone is soft and friable, and must be distinguished again from another sandstone also calcareous, and of a still softer character. The latter formation is of very recent origin, and has taken place subsequent to the upheavement of the primary and metalliferous rocks, as may be well observed in the vicinity of Koh i Aeenuk, where it occurs in the form of sand-hill—the sandstone strata are horizontal, the primary again are all highly inclined, and sometimes even vertical.

What the upheaving rocks may be I am yet ignorant, but believe they will be found to be granitic, and if so, they must be of a much more modern geological era than similar rocks in England, from the position of the sandstone of Dobundee, which is evidently a tertiary deposit containing lignite coal. A section from the passes in the mountains of the Hindoo Kosh to the Indus would be extremely interesting in a scientific point of view, and convey no doubt an accurate idea of the structure of the country, but this however would form a separate branch of inquiry of itself, and is not of immediate importance to the present research, which has reference only to mining and metallurgy.

When I lately had occasion to bring the mineral resources of the Himalaya mountains before practical men and capitalists in London, the voluminous Geological Report of the able and intelligent officer, the late Captain Herbert, was never read by them. All that they cared about was that portion of it which related to the metalliferous minerals and means of working them; and what chiefly attracted their attention was, his account of the seven localities where copper was produced in the Provinces of Gurhwal and Kumaon.

In an economical point of view, therefore, the first thing to attend to in a district where metals are known to exist, is its probable productiveness; and for this purpose a very close and minute examination of every rock, ravine, and valley is necessary to discover if metallic veins, or indications of veins abound. I have found these appearances in all the following localities:—

Views and indications of Copper, old Excavations, &c.—At Moosye in the pass of Shadkhanee in the limestone range, on the right bank of the Sagur river, and to the west of the village of Kuttasung, I found purple copper ore in very small quantity cropping out to the surface.

In the pass of Silawat to the east of Kuttasung, I found copper pyrites in greater quantity cropping out there. On the crest of the same pass, or rather a short distance from it to the eastward, indications of the metal appear in that quarter also, and seem to point either to grey copper, or to the vitreous sulphuret. The strike of the strata is about N. E. by E., and S. W. by W., dipping at an angle of 65° to the N. W. by N. Beyond this also, and still further to the Eastward, specimens containing purple copper ore in small quantity have been brought me lately from Kohi Chaghgye.

Again near the base of the same range, and within a short distance of the village of Kuttasung, are three old excavations, blocked up with stones and rubbish. Two of these I have been attempting to

clear out lately with the intention of reporting on them hereafter. The ore is the purple variety, and I also found indications of the vitreous strike of the strata N. N. E. and S. S. W. dip 65° W. N. W.

On entering the Pass of Silawat, there is a ravine to the Westward, where a spring with a few trees may be discerned. About a couple of hundred yards above this spring is another old excavation, blocked up like the former, the declivity of the mountain is here very great; strike of the strata N. E. and S. W. dipping about 62° to the N. W. are copper pyrites, in a hard quartzose matrix, wall of the vein soft and slaty, and covered with the blue and green stains of copper. Here the limestone assumes a slaty structure and then verges into a micaceous rock, from which I conjecture that the ore at a greater depth will make (as the term in Cornwall is) to mica slate. The decayed and withered splinters of this slaty limestone, at first sight have much the appearance of clay slate—East of this again I found another excavation in a micaceous rock, evidently a continuation of the last mentioned, the direction of the strata the same, and dipping in the same quarter at a high angle, ore copper pyrites. In the same line I have traced this deposit to another locality a short distance off.

On the Eastern, or left hand side of the road going up the Silawat Pass, is another old excavation blocked up like the rest. Strike of the strata W. S. W. and dipping about 65° N. N. W.

I saw stains of copper here, but observed no further trace of the metal at the time I visited the spot; a specimen of vitreous ore has however been brought to me since, which is reported to be from that quarter. Higher up the hill, and on the same side of the road, is another excavation, where I found indications of vitreous ore. Strike of the strata about N. E. by E. and S. W. by W. dipping about 65° to the N. W. by N.

About a quarter of a mile to the Eastward of the last mentioned, there is a singular deposit. A vein or bed of iron ore, upwards of 30 feet in breadth, containing another vein of a mixture of iron and grey copper in a space about two feet wide. This mixture of copper and iron has been worked to the extent of a few feet, but the difficulty of separating the copper from so large a proportion of iron, was no doubt too difficult an operation for the ancient miners to be attended with profit, and must have been abandoned accordingly. Strike of the strata here N. E. and S. W. dip 75° N. W. From the direction of the strata, and the external character of this iron ore, it must I think be connected underneath with a great bed of iron ore nearly 40 feet in width, which I discovered in the Silawat Pass. The ore is massive, and is of a steel grey colour; sometimes it gives a blackish streak, and then it affects the magnet considerably, showing the presence of the protoxide. The great mass however gives a red streak, and below the surface will no doubt be found a well-defined bed of specular iron ore.

To the west of the crest of the Silawat Pass, and near the summit of the range, which I suppose must be about 1200 feet above the level of the plain of Moosye, are some extensive excavations. The general strike of the stratification here is about N. N. E. and S. S. W.—in some places it is nearly perpendicular, or dipping at a great angle to the W. N. W.; one of these excavations at first appeared to me like an open working, having the form of a perpendicular chasm in the mountain, the depth of which I measured upwards of 40 feet, and varying from 3½ to 8½ feet wide, at the deepest part the measurement was 7 feet and three quarters.

From further observation, however, I am inclined to suspect that this excavation, but especially others of a far deeper and more extensive character at Koh i Aeenuk and Seestungee, occupied originally the spaces of galleries, or levels, and that these have fallen in since, either from having been shaken by an earthquake, as the wreck and ruin presented by some of them would seem to indicate, or what appears probable, the action of water from the melting of snow at the surface, percolating by the walls or sides of the veins, has in process of time gradually loosened that portion of the ground which was left as a protection for the levels, and these levels having been driven along veins that preserve their course with the direction of the strata, which are nearly perpendicular, will account for the chasm-like appearance they now exhibit.

The system of mining which has been pursued here, differs materially from our improved modern methods. Instead of taking up a more convenient position for commencing operations lower down the brow of the mountain, and driving a gallery for a considerable distance, perhaps through barren ground, so as to reach the vein at a proper depth, and which opening is made at the same time to act as a drain, the plan adopted by the ancient miners seems to have been the making of a small entrance, about 3 feet wide, and 4 feet high upon the vein itself, and having gone down upon it at once in a sloping direction, until a certain depth was attained, they pursued a horizontal course, and stripped the roof of ore in their progress. This inattention to drainage has answered so long as the ore could be followed without the occurrence of water, but I suspect even then in some places, they must have felt inconvenience from the water caused by the melting of the snow in spring. I do not believe from the appearance of the galleries which are still remaining, that timber was much used, if employed at all for supporting them. The structure of the rocks in most places being of a compact character, and the great dryness that prevailed, may have enabled the miners to work to a considerable extent without that aid. In excavating the ore and opening ground, these people seem to have used a sharp-pointed well-tempered instrument, as may be observed by the marks of their work on the walls of the galleries, particularly at the mine of Seestungee.

As the most important point to ascertain is the appearance of the deposits of ore at a considerable depth, the width of the veins, &c. I have been particularly desirous of penetrating so far under ground as to arrive at the different spots where the ancient miners left off working. In some instances I got so far, that I believed I should soon accomplish that object, but I have invariably had my progress arrested by large masses of rock, stones, and rubbish which have fallen in. A native of Moosye lately brought me intelligence of some deep excavations which have been discovered on the eastern side of the Silawat Pass. Upon asking him why he had not taken a light to examine the interior, and see if they were more perfect than those I had already discovered, he gave me to understand, that like the rest of his countrymen, he had superstitious misgivings in regard to the exploring of those old and abandoned excavations, and was further deterred by observing the skin of a snake at the entrance of one of the galleries. The dread of meeting reptiles of this kind in these deserted mines, is one of the reasons why the people are so ignorant about them. The same individual told me, that often as he had hunted over those mountains from his earliest youth, he had not the least idea that the excavations were so numerous, only a few had been observed, or were known to the neighbourhood until I commenced my researches.

On crossing from the Moosye range to the mountains of Baghgye, I obtained some rich specimens of vitreous and purple copper ore in different places, and also copper pyrites, but did not observe any regular vein, except one of copper pyrites in hornblende gneiss, which is about 10 inches wide; this is very poor at the surface, but may however at some depth turn out rich. At Kotil i Dushtuk, I picked up a good number of stones containing copper pyrites in a hornblende gneiss formation, running N. E. and S. W. and dipping about 55° N. W.

This rock is very dark in some places from the prevalence of the hornblende, in others it has a yellow weathered appearance, and so much disintegrated, that I had not an opportunity of examining the locality well; there are quantities of rock, green-stained from copper. In one place where it was more compact, I obtained specimens from some strings or small veins of copper pyrites, in a quartz matrix, evidently connected with a larger vein, and from the abundant indications at the surface, I suspect that a considerable deposit must exist underneath. From Dundhance in the direction of Jowhar to the south of Rotil i Dushtuk, specimens of green-stained rock have been brought me lately, and said to be in still greater abundance.

To the south of the Baghgye range is the great mine of Koh i Aeenuk, which I have already mentioned, all in a state of ruin and dilapidation. Purple copper ore crops out to the surface; and the excavations, as well as a quantity of slag and vestiges of ancient houses that remain, show what a productive mine this must have been in former days. The dreary and desolate aspect of the spot, with a solitary hut and a few squalid inmates, afford a melancholy contrast to the throng of industry which must have been witnessed here in better and more prosperous times. About a mile West of

Aeenuk is the mine of Seestungee, which I have also mentioned, and which is in a similar condition with the former. In this mine there is a chamber, one side of which is covered with sulphate of copper; the chamber is about 18 feet in length, 12 in breadth, and 10 in height,—and the end of it is blocked up with stones and rubbish. Some of the excavations here are so large, that they have more the appearance of caverns than mining galleries. A short distance from this, on the road to Koh i Aeenuk, I observed near the summit of a limestone rock several veins of spar carrying copper ore, principally copper pyrites; one of these is about 11 inches wide; between this again and Aeenuk, there is another spot where the green-stained indications of copper appear abundantly, showing, that the metal exists there likewise.

East of Aeenuk, in the mountains of Acoorookhail, I found a vein of solid copper pyrites about an inch thick in hornblende gneiss; at Essurtungee on each side of the torrent, I observed copper ore in many places, though I was not fortunate enough in finding a regular vein, whole cliffs of the rocks however are covered with the indications of copper. The richest specimens of red oxide of copper and native copper in my possession, were brought to me by a native, and said to be from the hills of Goorgee Mydan, not far from Acoorookhail. Of the locality, however, from whence they were procured I am doubtful, as the native alluded to was indebted to another for the specimens. I opened the ground in one place to the extent of several feet, and though a few indications of the metal appeared, many circumstances rendered it evident, that they had not been procured from that exact spot, and that a further search was necessary.

At Derbund, in Tungee Khooshk, in a gneiss and mica slate formation, I observed abundant green stains of copper. At Kila Ataye, there are several veins of quartzose spar carrying purple ore, one of which I measured about a foot in breadth, the rock is mica slate, and contiguous to limestone. In Cornwall the richest deposits I was told generally occur at the junction of the clay slate with the granite; and in this mineral tract, I believe the most productive will be found at the point of contact of the limestones with other rocks.

At Tezeen, I discovered small veins or strings of rich ore ramifying in different directions, and forming a kind of net-work in a limestone rock. I saw no decided course of ore of any bulk, but what there is of it, is very rich, being composed of the vitreous and red oxide varieties, and native copper. The chief of Tezeen, I am told, found a mass of the latter close by his house on one occasion, and so large, that a copper vessel was manufactured from it. This must have been brought down by the mountain stream, and most probably from the quarter I have mentioned.

In a ravine at Khoondurra, between Seestungee and Dobundee, I obtained some specimens of copper ore in small quantity, but did not discover any vein, though a closer search may yet succeed from the indications of the metal in that quarter.

At Dobundee, on entering the valley, I found at Shinky, on the right bank of the rivulet, specimens of red oxide and grey copper, but discovered no regular vein at the time. In a ravine named Lahazour, about half a mile from Shinky, I observed in a hornblende formation an outcrop of grey, vitreous, and red oxide of copper accompanying a vein of spar principally calcareous. Beyond this in another ravine named Zerazour, there is a thin vein of rich copper ore similar to the preceding—formation still hornblende; the strike of the stratification in this direction, is nearly N. E. and S. W. dipping about 65° to the N. W.

In the ravine of Chinarkhail, I found a vein* of copper pyrites cropping out in small quantity, and higher up at Chenar, less than a quarter of a mile from thence, I found a vein of grey copper, about 7 inches wide, with a considerable proportion of iron; this vein bends a good deal in consequence of the twisting of the strata, the general direction of which is about N. E. and S. W. dipping upwards of 60° to the N. W. The formations here are all hornblende.

* When I use the term of *vein* it is to convey my meaning in more familiar language, at the same time the Cornish phrase *lode*, which signifies a course of ore, would, properly speaking, be more correct. All the lodes in this country are what would technically be termed beds of ore conforming with the strata, and not veins, which are rents or fissures traversing the strata, and filled up with mineral substances.

In the ravine of Jerobace there is a ferruginous looking vein, containing vitreous ore, and also grey copper, the latter has a large proportion of iron, and is found about 5 or 6 yards apart from the former. On the opposite side of the ravine I found indications of the metal also, and beyond this in the same line, I found similar indications in a small ravine adjoining, and believe these to be all one and the same deposit connected underneath. The strike of the strata here is N. E. and S. W., all highly inclined. About 300 yards to the N. W. of these localities is another out-crop of copper ore, with a good deal of the same ferruginous appearance; this seems to bend towards the others, running nearly East and West, but is a distinct deposit in my opinion, and unconnected with them; these veins are all found in hornblende.

During my survey of Dobundee, I observed several rolled masses of a dark coloured iron ore brought down by the river. This ore yielded a blackish streak, and affected the magnet, but did not attract iron filings. What I observed was evidently derived from the surface of a bed of iron ore. In the Chenar ravine, about a couple of hundred yards from the vein of grey copper, which I have described, I obtained a few fragments of magnetic iron ore which powerfully attracted the filings, but saw no trace of a regular deposit in that quarter. These facts, however, render it not improbable that a bed of magnetic iron ore may exist in the neighbourhood; having not yet completed my examination of that part of the district, I regret I cannot speak decidedly on this subject.

Extent of the District, &c.—With regard to the extent of this mineral tract, Tezeen is the furthest point to the Eastward, where I have found copper ore, and specimens of copper pyrites have been brought me from Wurduk to the Westward. Specimens of purple ore have been sent me from Spaga to the South, and I have traced the metal as far North as the hills about Cabool.

The most promising veins I have discovered are those of Derbund and Dobundee,—of the old mines, Koh i Aeenuk holds out the best prospects. I have reason to believe that more veins equally, if not more favorable, may yet be found, when every rock is sufficiently investigated. A perfect examination of this kind, is of great importance, for the two-fold object of showing the external signs of the productiveness of the strata, and guiding the miner at once to the most desirable points for experimental operations. From the number of natives I have been employing to search for me throughout the district, and who well understand now what is wanted, I feel confident that if this plan were continued for a short time longer, not a spot would remain unexplored. Specimens have been lately brought me from new veins in Derbund, as well as from Rojan, and Sungdurra on the southern side of Koh i Kubeer, the most elevated of the mountains in that quarter of the country.

In my former Report, I mentioned that I had discovered the richer varieties of copper ore, namely the purple and vitreous sulphurets, the former containing 60 per cent of metal, and the latter about 80—I have now the satisfaction of adding to these the red oxide containing 90 per cent, and native copper. As far as the character of the ore is concerned then, it is of the first quality. Of course what I allude to is the pure mineral unadulterated by the matrix. What the ore in mass will produce should the mines be opened, can only be determined when that takes place; but it will I think, yield about the same as the Chilian, namely, between 20 and 30 per cent. The average of the ore of Cornwall is between 8 and 9 per cent, and, as I stated in the Report alluded to, it is this difference in the quality of the ore, that enables the Copiapo Mining Company to dispose of their ore in England at a profit, notwithstanding the vast distance of transport. The ore is brought down on the backs of mules from the heights of the Cordilleras to the seaport for £3 per ton, shipped from thence to Swansea in Wales for £5 per ton, when it is finally smelted, and the produce exported abundantly (no doubt to India) as English copper.

Mineral Prospects of the District.—In respect to the capabilities of this mineral district no one can take upon himself to form an estimate of what is underneath the surface, until practical trials are made, but, if we base our calculations on the most reasonable probabilities, there is every expectation that these trials will prove eminently successful.

By the foregoing details it is apparent, in the first place, from the number of veins and indications of them which have been discovered, that the whole of the strata are highly metalliferous.

Secondly, the quality of the ore is excellent, and the richest varieties are to be found.

Thirdly, it is evident, from the extent of the excavations of Koh i Aeenuk, Seestungee, and Moosye, as well as the quantity of slag still remaining at the former place, that the people who worked these mines, must, in following the ore to a considerable depth, have found it increasing, or at any rate not diminishing in quantity.

Lastly, we may reasonably infer, that these people, by confining their operations to so few localities, found the work sufficiently plentiful and lucrative to give them employment, without being under the necessity of opening new ground, and this will account for so much being left untouched. The mines also must have been abandoned in consequence of some political convulsion or foreign invasion.

Facilities for working the Mines.

Of the means of drainage, I may say, that in general there is no want of declivity of

Means of Drainage. ground for obtaining adits—the term *adit* is a technical one in mining, used to denote a gallery or passage which acts at the same time as a drain. In an economical point of view, this is of great importance, as the system of working by a succession of galleries above the adit-level in some mines, or having to go but a short distance under it in others, is attended with much less outlay than when the reverse is the case, and mechanical power must be had recourse to, for raising the water from a considerable depth to the drain. In the Gwennap mines in Cornwall, for instance, where the deepest shaft is about 1700 feet below the surface, there are no less than seventeen steam engines, some of which are of enormous size, and these, with a water wheel 42 feet in diameter, are employed night and day in pumping the water, and raising ore and rubbish from the mines. In the Moosye ridge, the principal mines are situated about the summit of the mountain; at Koh i Aeenuk again, which is but a small hill in comparison, there appears to be abundance of room for bringing in an adit under all the old workings, but at Seestungee, this would not be managed so easily. The whole of this metalliferous tract, however, is so much more elevated and mountainous than the mineral ground of Cornwall, that the unwatering of the mines could be effected with greater facility, and at much less expence.

Small streams for washing, cleaning the ore, &c. are often wanting in these mountains, but this defect may be remedied wherever springs may be observable, by piercing the slopes with *karezes*, and obtaining the necessary quantity of water. At Derbund, there is a small stream which passes close by the veins of purple ore I have described. The river of Sogur pursues its course along the base of the range at Moosye, where the mines are situated; the rivulets of Dobundee, Tezeen, Chuckeree, &c. at all seasons of the year have a sufficient supply for moving machinery, whilst mountain torrents, such as those of Esourtungee and Jerobace, possess I think sufficient water, considering the greatness of their fall, for turning stamping mills, and crushing apparatus of that description.

The pine forests which stretch from the Sufued Koh to the Southward, will afford a permanent supply of wood for timbering the mines, and charcoal for the smelting furnaces. The same carriage which would convey the ore to the fuel, would bring back timber for the mines. The furnaces best adapted for this country, are not the reverberatory ones of Swansea, where coal is the fuel, but

the blast furnaces of Sweden, where charcoal is employed. It will be a matter for future consideration, whether the most desirable site for these would be in the direction of Spegā and Hazardurukht, or of Tezeen. The former will have the advantage of being better situated for labourers, whilst the latter, by being near the Cabool river, will have the convenience of raft carriage to the Indus.

Mining operations may be commenced in this country without incurring much expence in road-making at the outset. At present the roads are only tracks, but they answer camels, and the mountains afford pasture for the maintenance of these useful animals. Mules, ponies, &c. are also used for carriage, and the neighbouring district of Koorrum is famous for its breed of the former. Roads for wheeled carriage may in process of time be made, as improvement advances, and this will create a great saving in transport throughout the country generally. An excellent one might be cut from Cabool to Dobundee, by the plain of Sogur, and no doubt the same could be continued to the banks of the Indus by the valley of Koorrum; guns at any rate have already been taken by that route. As soon as this road is surveyed and repaired, and political obstacles are removed, the circuitous route by the Khyber Pass will be forsaken for this shorter and safer line of communication with Hindoostan; meanwhile as far as the mines are concerned, the most economical method would be to purchase a certain number of camels, the transport management could then be conducted at a moderate expence, and occasion very little trouble.

The occupations of these mountain tribes are partly agricultural, but chiefly pastoral and commercial. Those who have flocks of sheep migrate from place to place according to the season of the year, whilst those who have camels, engage in trading speculations, and in hiring out their camels for transporting wood, charcoal, &c. to Cabool, salt from Kalabagh and Malgeen, iron from Bajour and Foormool, and merchandise to and from Peshawur, and various other quarters.

I regret to add, there is another class that I call the predatory, which the poverty of the people, the distracted state of the country, insecurity of property, &c. appear to have brought into existence, and gangs of these banditti have been infesting the country to the no small detriment of the industrious merchant. The different tribes which contain this class within them, are the following :—

Adrumzyes	Rob by night.
Muminozyes	Ditto ditto.
Ahmedzyes of Spegā	Highwaymen by day.
Kurrookhails	Ditto by day and night.
Khivazuks	Rob by night principally.
Ooreakhails	Ditto ditto.
Ootkhails.	Thieves by day principally.

These molest the country between Ghuznee and Jelallabad—some rob chiefly by night, break into houses, annoy an encampment, &c. others steal in broad daylight, in the bazar of Cabool even, and are famous for their dexterity in pilfering; whilst others again come down from the mountains in force, attack a cafila, and return immediately with the property they have captured.

It need not be supposed, however, that because a portion of the people have hitherto been leading this lawless life, that the hope of establishing useful works, even in the secret haunts of these robbers, is by any means impracticable. It must be remembered, likewise, that a revolution has taken place in the country, and that during the last year, the constant political excitement which was kept up, of itself produced much of this evil. Formidable as the state of affairs may seem, the difficulty of uprooting the evil is much more in appearance than in reality. There is indeed a regular system of robbery carried on, which must be systematically dealt with, to be effectually put down. This I believe may be accomplished without levelling a single fort, ravaging an acre of ground, or spilling one drop of blood. The Ghilzyes of that district, are about the finest race of people I have seen in Afghanistan, and the predatory portion, though wild, are far from being intractable. But they have been long living without the pale of the laws, in a country distracted and torn with feuds and dissensions, without any security of property; the strong ever oppressing the weak, and have in a great measure been brought by circumstances into this lawless mode of life. Give them, however, but constant employment, with good wages and regular payment; encourage a spirit of industry, both by precept and example; let strict justice be dealt out to them without respect of persons; and we shall shortly see their swords changed into ploughshares, industry take place of licentiousness, and these people be converted into peaceable and useful subjects. A firm, but just and liberal hand, in my opinion, might mould them into any thing.

During the late disturbances, it was often remarked to me, what a detestable race these Afghans were; that a man could not stir a few yards from his house or his tent, without the risk of assassination; and that three times the amount of military force was scarcely sufficient to keep this unruly country in order; and yet, I have gone with but a few followers into the midst of them, have wandered amongst the wildest and most desperate characters, often without a sword at my side or a pistol in my belt; and even during the very crisis alluded to, when I returned to Cabool, I did so entirely in opposition to my own views and inclination, and only in accordance with an express order to that effect.

Since I commenced this research, I have made a point of living with the people, and I am of opinion, that in any attempt to develop the resources of a country, an acquaintance with the character of the inhabitants is a matter of serious consideration. The result of my observations are these: that if we take advantage of the keen commercial spirit of this nation, and direct its energies into the many useful channels which may be opened to them; if the conciliatory policy be steadily persisted in, all gloomy suspicions as to our future intentions removed, and the Afghans become persuaded that we are really their friends;—there is no quarter of the east where British influence will more rapidly take root, and British power be more readily consolidated—whether the nature of the climate, the wide field for European improvement, or the freedom from prejudice on the part of the people be considered.

It is not easy to say exactly, what the rate of payment for labour would be in those mountains, when order is completely restored, and a new state of things brought about; but there can be no doubt of this, that it will be moderate.*

* Osman Khan, who is a considerable landed proprietor himself, and experienced, is of opinion that only one-third of the available land of Afghanistan is under cultivation.

Osman Khan informs me, that during Dost Mahomed's time, he used to hire able-bodied labourers for cutting canals, and reclaiming waste land at Balabagh, at the rate of two annas per day; but that now he hires them for about three annas. The rate which at present exists in Cabool is a forced one, the result of a combination of circumstances, which can only last for a limited period until things find their proper level.

The Jajee tribe, and other industrious mountaineers, are all robust and stout-looking people, and during the winter travel as far as Peshawur for employment, which they would not be induced to do if work were afforded them at home. There are few points in the country more favorably situated for a command of good workmen than the mining district under discussion.

As the price of labour, however, is directly affected by the price of food, it will be a matter of great importance for the successful working of the mines, that the arable land in their vicinity be properly attended to. If the mountains bear witness to an extent of industry unknown to their present ill-fated occupants, the state of agricultural affairs in the adjoining fertile plain of Mogur, bears equal evidence of a former state of great prosperity, and points, in a significant manner, to the withering effects of Afghan misrule. The remains of ancient canals and water courses, the quantity of available land now lying waste, or in a low state of cultivation, the wretched condition of the people, and their inability to procure the necessary means of cultivating the soil, all show how much might be done by the application of capital, as well to the labours of the field, as to the dormant mineral resources of the country.

In conclusion, the following facts I would submit, may be considered as fully established, viz.:

Decided indications of abundance of copper, and of the richest varieties of ore. Wood in abundance, for timbering the mines, and for charcoal.

Water as a moving power for impelling machinery, thus obviating the expence of steam, camels, mules, &c. for carriage.

A hardy and able-bodied population on the spot, anxious to be employed as workmen.

Here therefore are the means for the production of this metal, and apparently to any required extent. It now only remains, that the inquiries I have had the honour of commencing, should be followed up; arrangements made for the suppression of the preparatory system; the providing an adequate capital for working the mines on scientific principles; and adopting such measures as will facilitate the transit of metallic produce to water carriage on the one hand, and the different marts in the interior on the other.

Iron of Northern Afghanistan.

As no mining operations can be carried on without a command of well-fabricated iron, the state of the manufacture of this indispensable metal becomes a primary consideration, in any attempt to render the mineral resources of an uncivilized country available; and certainly if any thing be required to show the abject state of the arts in this quarter of the globe, the iron trade and manufacture may be quoted as an instance.

The iron of Bajour, which is produced from magnetic iron sand, is not only in use throughout the northern districts of Afghanistan; but from its superior quality, is

likewise in great demand in the Punjab. It sells in Cashmeer, for three times the price of the common iron of that country, and it is used in Candahar for the fabrication of matchlocks.

Were an improvement in the manufacture to take place, iron might no doubt be obtained equal to the Swedish—the best description in Europe. It was my intention to visit the district of Bajour at this time; but having been prevented from accomplishing my object, I am dependent on what information I have picked up hastily from merchants and others, who have been in the habit of visiting it, for the purpose of purchasing iron. The supply of iron, however, which the mountains in that direction afford, must be perfectly inexhaustible, from the intelligence I have derived, as to the immense quantity of this iron sand, which is annually washed down from their deposits.*

A sample of the sand was brought to me sometime ago, and taken from the bed of the stream at once, without being sifted and prepared for smelting. On applying the magnet, the ore was immediately taken up, and the quartzose and other strong particles remained. I then placed a small quantity of iron filings in contact with the ore, and the mutual attraction of the filings with the crystals of ore, was easily recognized with the assistance of the magnifier. It is described as occurring in great abundance in the mountain streams of Deer, Belour, and Mydan, which fall into the river of Punjcora, that ultimately joins the Cabool river below Peshawur.

The methods of reduction in this country, appear to be the same with those employed in different parts of India; and the manufacture in the Himalaya mountains, already described by Capt. HERBERT, is equally applicable to that of Bajour. It is evident, that whatever quantity of the ore is submitted for reduction, a small proportional part of the iron contained in the ore is brought to the state of useful iron. In the first process, a very crude mass of iron and scoria is produced; this crude mass is then submitted to the fire by a blacksmith, and after an incredible sacrifice of labour, a piece of malleable iron, fit for ordinary purposes, is at last produced, which, as may well be supposed, is any thing but the purest.

A more rude and inefficient system of smelting could not be devised, nor must it be understood from the simplicity of the management, that the processes are economical—they are the most expensive which could possibly be employed. It would be absurd to suppose that a refractory metal like iron, can ever be properly or economically fabricated by means of a great expenditure of manual labour, to the neglect of a mechanical power, such as a plentiful stream of water can afford, and which is to be obtained abundantly in the district that yields the sand I have described. So long as the miserable air bags, and a common blacksmith's sledge hammer are used for that purpose, iron inferior in quality, very deficient in quantity, and at an extravagant price, must be the necessary consequence.

But Afghan inexperience and mismanagement does not stop here. The crude iron is not converted into malleable on the spot, where charcoal abounds and labour is exceedingly cheap; but is transported slag and all, to Cabool, for instance, where both charcoal and labour are exceedingly dear. Again, in working up this

* Should there be a proportion of titanium combined with this ore, I imagine it will be trifling. When I submit a supplementary Report, with the chemical analysis of different ores, this will be explained. The colour of the iron sand is dark black.

crude iron into malleable, one-third is lost, so that the unfortunate purchaser has not only to pay for an expensive and ill-manufactured article in the first place, and for the difference in the price of labour and charcoal, pointed out in the second, but for the carriage of a large proportion of dross.*

The cost of the transport of a *khurwar* of iron, (13 Hindoostanee maunds,) in Dost Mahomed's time, was about Rs. 15 from the Punjcor ariver to Kooner, and from thence to Cabool Rs. 10, making in all Rs. 25. At present, the hire will I am told, be about Rs. 35; but for the sake of example, let Rs. 30 be looked upon as the expence of conveying a *khurwar* of iron from the Punjcora river to Cabool. A hundred *khurwars* of this iron are said to be about the quantity annually consumed in Cabool, in the time of Dost Mahomed; lately the demand has greatly increased. Taking this quantity only, however, as the estimate, we have at the rate of Rs. 30 per *khurwar*, an expence of Rs. 3000 for carriage; but to render the iron fit for use, one-third is lost, so that an expence of Rs. 1,000 is every year incurred in Cabool, for the conveyance of slag. The information I have been able to gather respecting the probable quantity annually produced in Bajour is so vague and contradictory, that I do not feel justified in carrying out this calculation farther. At a guess, I believe it must be about a thousand *khurwars*; but be this as it may, there is no doubt, that the saving, effected by a well manufactured article in the mere transport alone, would in a short time cover the expence of erecting an iron work upon the Swedish principle.

As a set-off to the practical difficulties inseparable from establishing works of this kind in a new and uncivilized country, the advantages which the manufacture of Bajour would possess over that of Sweden, would be these:—

First. The difference in the price of labour, the wages of a workman being about 2 annas per day, according to the present rate; whilst labour in Sweden, though moderate, varies from 6d. to 1s. per day. Allowing, however, that the price of labour should rise in Bajour, and that able-bodied workmen received from 2 to 4 annas per day, still the rate would be considerably less than the Swedish.

Secondly. The circumstance of mining being commuted for the easy process of collecting and washing the sand, would occasion a great saving of expence; women and children are employed in this operation.†

Thirdly. The forests are described as being of great extent, and close by the localities where the iron sand is collected, and the charcoal used, is made from oak (*quercus beloot*), which is the best adapted for that purpose. This will give the manufacture of Bajour a decided superiority over that of Sweden, where the light charcoal of the pine only is used, oak and hard wood being scarce in that country—the charcoal moreover is transported in sledges during the winter, a distance frequently of 30 miles to the furnaces.

I shall here offer a few observations on the subject of the iron in Northern India, for the purpose of showing, that if an improvement be called for there, the argument applies with still greater force to the remoter regions in this quarter.

* The iron is sold in the shape of bricks of different sizes. In making a trial the other day of one of these, which weighed one seer of Cabool, (equal to six seers of Hindoostan,) I obtained out of 16 parts, 10 of iron fit for use.

† The iron sand is brought down annually by the melting of the snow in spring, and in such vast quantity, that for one iron work at any rate, the supply is ample without having recourse to mining.

It is commonly imagined in India, that because English iron is brought out as ballast, and landed on the coast for little more than the price it costs in England, that an improvement in the native manufacture would therefore be attended with difficulty. But however much this may apply to the coast, the case is altered when English iron is transported into the interior. It then becomes enhanced in price, and from this cause, as well as the inferior materials of which it is composed, the demand is limited, whilst the native manufacture continues active under all the disadvantages of the most wretched system of smelting, and which, as I have already remarked, is in fact, the most expensive that could be employed.*

All the iron of England, (with the exception of what is produced at Ulverstone in Lancashire,) is made from clay iron stone, which yields about 30 per cent. of metal, and the fuel used being coal, the sulphur combined with the latter deteriorates the iron, and soft or malleable iron cannot be produced equal to the article that is afforded by richer ores, and charcoal smelting. In the Northern Provinces of Hindoostan we have the richest iron-ores, namely, the magnetic, and also the different varieties of the red oxide, such as the specular, red hematite, &c. and these will yield from 50 to 65, or perhaps 70 per cent. of metal, which is all in favour of the saving of fuel and general economy.†

At Ulverstone in Lancashire, iron is manufactured from red hematite ore, yielding sometimes 50, and sometimes 60 per cent. of metal; the fuel is oak charcoal, and a superior iron is produced, which is of great tenacity, and much used for drawing into wire; steel also is made from it for secondary purposes.

During my inspection of these works some years ago, I was closely questioned by one of the iron masters as to the prospects of establishing an iron work in the Himalaya mountains: for example, I was asked about the nature of the ore, and if a sufficient supply of charcoal was to be had, if water as a moving power was abundant, labour cheap, and if water carriage was procurable, &c. &c. To which I replied, that amongst different varieties of rich ore, the red hematite, the same he had at his works, existed also in that quarter; that charcoal was to be had on the spot, for the price only of cutting the wood and preparing it, as the forests were interminable; that labour was about 3*d.* or 4*d.* a day; streams capable of turning any machinery abounded, and water carriage was within a tangible distance of the base of the mountains; that the disadvantages at present, were owing to the want of proper commercial roads from the mines to the plains, which nevertheless might be made by following the course of the principal rivers, as indeed had been done partially in one case, for the sake of pilgrims. I then rallied him about the anxiety he seemed to evince in the matter, and asked him if he was afraid of my running in opposition to him so far off as India, and moreover 1,000 miles in the interior; to which he replied, "Why to tell you the truth, we send out a quantity of iron to India."

Now whether the iron of Ulverstone be used in Calcutta for the manufacture of suspension bridges, I am not at this moment aware; but when I left Kumaon two years

* According to Mr. McCulloch, three-tenths of British iron are used as cast iron, and principally consumed in the United Kingdom, the other seven-tenths are converted into wrought iron.

† Some of these iron mines are situated near the plains, some are higher up, and the copper mines higher up still. The principal iron mine is at Khetsari, in the broad and fertile valley of the Ramgunga.

ago, thirteen of these bridges* had been erected, in a province abounding with iron mines, and inexhaustible forests, and with reference to which, a celebrated mining engineer, in corresponding with me upon the subject, makes the following remark: "It strikes me, that if an iron work is begun in the Himalayas, iron can be afforded to India at a rate lower than the present to a great degree, and at the same time afford a large profit per ton."

In the district of Bajour, an iron work upon the small scale, and similar to the Swedish, might be erected with every reasonable prospect of advantage. When water power can be procured, and a steady supply certain, the saving will be great,† as compared with the application of steam power; a substantial wheel can be erected at a small expence, for working blowing apparatus capable of giving blast to two furnaces; commencing in the first place with one, in order to learn by experiment the suitable charges of iron ore, charcoal, and limestone; and to find that very little iron is mixed with the scoria, which comes off constantly from the iron at the bottom of the furnace.

Should an improvement of this kind take place in the Bajour manufacture, iron of a much better quality, in much greater quantity, and at a reduced expence, might be afforded to the whole of those countries situated between Ghuznee and Lahore; from the excellence of the materials, no foreign iron can ever compete with it, and superior steel may also be obtained from it. No iron manufactured with coal can ever be converted into steel, owing to the presence of sulphur in the coal. It is in consequence of this, that the great mass of steel in England is made from Swedish iron, and the cast steel for the superior cutlery of Sheffield, is from the iron of the mines of Dannemora, the ore of which, (massive magnetic,) differs from all the others in Sweden, on account of its purity; and the iron sells on that account for about double the price of common Swedish iron. The other ores of that country are, I understand, principally magnetic; but more or less contaminated with sulphur, and had they not the advantage of charcoal smelting, the iron they produced would not sell at the high price which is obtained for it.

The prices of crude iron in Cabool in time of Dost Mahomed Khan, and since then, have been the following:—

	In Dost Mahomed's time.					Latterly.				
	Cabool Rupees.					Cabool Rupees.				
Bajour iron per md..‡	8	..	..	..	..	12				
Foormool ditto ditto,	6	..	..	..	..	9				

* The transport of the last of these bridges, which was put up at Jula Ghaut on the Kali Gogra river, amounted to Rs. 80 per ton. This reminds me of a story that is told in the neighbourhood of Loch Earn, in Perthshire. In a small glen on the Northern side of the lake, a building was erected about a century ago, when there were no good carriage roads in that part of the world, as is the case at present. The lime used on the occasion, was brought on the backs of horses from a considerable distance in Fifehire, and it was left for the succeeding generation to discover that an excellent bed of limestone existed in the same glen; but this was not all, for the house itself was built of limestone.

† Perhaps the finest example that could be quoted of the effect of water power in saving manual labour, is at Turton near Bolton, where there is an iron wheel at a cotton mill, upon the spider arm construction, overshot, sixty feet in diameter, and ten feet broad in the awes or buckets. From this wheel, the power is taken for moving all the spinning machinery within the mill, which is reckoned equal to 50,000 cotton spindles, or the work of 50,000 people.

‡ The maund of Cabool is equal to 8 seers of Cabool. The seer of Cabool, is equal to 6 seers of Hindoostan.

The iron of Foormool is from the country of the Wuzereas, in the direction of Kaneegocorum. It was my intention to have visited this district after surveying Bajour, for though the iron is much inferior to that of Bajour, it is very abundant, and extensively used for implements of husbandry, horse-shoes, cannon balls, &c. The specimens of ore which have been brought to me, and reported to be from that quarter, are clay iron stone, and I believe this to be ore, from the fact of coal existing in that vicinity.

Should a foundry for cast iron be eventually required in Afghanistan, the iron in the Wuzeree country will be well adapted for the casting of shot, shells, engine cylinders, pumps, &c.; whilst for bars, rods, fire-arms, &c. the superior iron of Bajour will always be preferred.*

I have mentioned the existence of iron ore in the copper district which has been described. The Moosye iron is not conveniently situated for fuel to render it of immediate importance. A specimen, however, of iron ore has been brought to me from Huryoob in the Jajee country, which borders on that district. The ore is of an iron-grey colour, and gives a red streak, but does not affect the magnet. It is reported to be in great quantity, and the country is described as being covered with jungle. Should the copper mines in the course of time be worked on a great scale, and the consumption of iron proportionate, mines of the latter metal will also be worked there, for the sake of the demand in that neighbourhood, and of Cabool.

In concluding these imperfect notices on the subject of the copper and iron deposits of this country, I would beg to observe, that in directing attention to the former metal, I do so, not only on account of the demand of it for coinage, and the ready market it meets with from its extensive use for domestic purposes throughout the countries to the west of the Indus, but from the known demand for it to the east of that river likewise.

Should gold or silver mines be discovered in these regions, and there is nothing unlikely in the idea that they may, the probability is, that they will always, as far as intrinsic value is concerned, occupy a very inferior scale of importance to the copper repositories.

If it be a common saying in South America, (the richest country in the world for the precious metals,) that "a copper mine is a fortune, a silver mine scarcely pays itself, but a gold mine is ruin," we may readily conclude, that in this quarter of Asia, where there is such an extensive consumption of the former, the observation is still more likely to become applicable.

But valuable as these repositories of copper may prove, they again need not be expected to equal the results which may be anticipated eventually from working the great stores of iron to be met with in Afghanistan.

By rendering the copper available, however, for which there is such a great market, a fresh demand is provided for the iron; and an improvement in the manufacture

* There is another iron produced in another locality in the Wuzeree country, from which steel is made. The ore I have not yet seen, but it must be from a different formation to the one which contains the clay iron stone. I shall advert to this in my supplementary report.

of the latter will not only directly aid the working of all metallic veins which may be found, but become the basis of various superstructures, and when its more general use is induced by a deduction in price, civilization and improvement will rapidly extend.

It is commonly supposed in this, as in other barbarous countries, that Russia must be rich, since gold mines are reported to be there. But the gold, the platina, and other metallic produce of the Urals, are well known to be far inferior in financial importance to the iron, and if in the Uralian chain, the activity and enterprise of the Muscovite can fabricate annually the large quantity of 7,400,000 pood, (132,000 tons) of iron, what may not British energy and industry effect, when they come to be applied to the vast deposits of iron, and the deep and endless forests of the Indian Caucasus and Himalaya.*

Remarks on other Mineral Productions of Northern Afghanistan.

I proceed now to offer a few observations on the other mineral productions of this country, and I may here mention, that the plan I have been pursuing hitherto, has been to employ the natives themselves to search in all directions, and bring me every kind of mineral which has the appearance of an ore. The exciting a spirit of inquiry in this way, although it has been expensive to myself, is by far the most expeditious method of enabling one to arrive ultimately at a general knowledge of what the country may possess. During the previous year, the political ferment that existed thwarted my success very much; but now that these troubles have ceased, and the attention of the people is withdrawn from them, the fruits of this plan, if followed up, will become much more apparent. Nothing can exceed the avidity with which the Afghans enter upon what to them is so novel a pursuit; and the laborious, and ardent manner in which they traverse the most rugged rocks, and most unfrequented places, when stimulated by an appeal to their interests. It is my rule to pay them well, when I have any thing like proof that they have worked hard, even though they have been unsuccessful; and, on the other hand, if successful, they are sure of a handsome reward.

Of the valuable mineral coal, there are three directions in which lignite coal is
 Coal. found in the northern districts of Afghanistan.

The first formation is along the line of the Indus, the most promising locality of which appears to be near Kaneegoorum in the Wuzeeree territory.

Parallel to this, is a second outcrop of coal in the Ghilzye territory, which I discovered lately at Dobundee, and whilst I have been writing this paper, specimens have been brought me from Hissaruk.

The third formation is in the Huzarah country; specimens of this have been brought me from the vicinity of Syghan.

* According to a pamphlet published in 1825, by Mr. H. J. PRESCOTT, for the removal of the high duty on foreign iron, it is stated: "The quantity of iron exported from Stockholm in the year 1822 and also in 1824 was 36,000 tons. Sweden in general exports perhaps 100, or 102,000 tons."

All of these deposits of coal are of the lignite species ; the mineral is of a velvet black colour, and approaching to jet or pitch coal. The Kaneegoorum coal burns freely ; and with much flame and smoke ; the Hissaruk is rich-looking, crumbles into angular fragments, and particles of it, as well as that of Dobundee, which I have tried in the flame of a candle, burned well, considering that they were obtained from the surface. What I have as yet discovered at Dobundee is in very thin seams, pulverulent, and resembling coal-dust more than anything else. The Syghan coal ignites with great difficulty, and the flame, which is very slight, has a greenish tinge. Underneath the surface, this character may be expected to alter considerably for the better.

Although this coal is of a subsequent geological date to the mineral we are accustomed to use in England, which belongs to what is technically termed the " independent coal formation," it by no means follows, that profitable beds of it may not be discovered, and in time create a great change in the comfort and commercial prosperity of many parts of this kingdom, where wood is extremely scarce. Coal of this description is extensively used in many parts of Europe, and is frequently of excellent quality.* It is mined in the island of Veglia for the use of the Trieste steamers. Twenty-eight beds of it are wrought about Toulon and Marseilles. At Colongnet here is a bed of it 30 feet thick ; the mines of Styria, and of Buda in Hungary, are famous for their immense supplies of this fuel ; great beds of it are worked in Switzerland, in the valleys of the Po, the Danube, and other quarters of the continent.

It will readily be acknowledged, therefore, that although the coal deposits of this country belong to a more recent geological period than that of the independent coal formation, it would be an unphilosophical conclusion to suppose on that account, that they may not exercise the happiest influence on the welfare of its inhabitants. To the Huzareh, the possession of this substance, if found in sufficient quantities, would prove most invaluable. It would enable him to work with every advantage his abundant mines of iron, copper, and lead ; and in a country with so rigorous a climate, and so destitute of fuel, it would be to him the most useful production. Should profitable beds of the mineral be discovered in the direction of Dobundee, there is a level road from it to Cabool, by the plain of Sagur ; and how far the formation may be traced along the Ghilzye tract is yet unknown.

Lastly, the coal of the Wuzere territory may turn out of importance, as well for the working of the extensive iron mines in that quarter, as for steam navigation on the Indus.

Amidst the numerous samples of ores which have come under my observation, the gold, &c. which is brought down by the streams from the mountains above Lughman and Kooner, is all that I have as yet seen, which I can pronounce upon as pertaining to the precious metals. It is stated to be found likewise in streams from the Kohi Baba range, in the country of the Huzarehs, and

* At a single establishment in Wales, there are 13 large blast iron furnaces at work, and it is estimated that their consumption of fuel is 400,000 tons of coal per annum. Works like these convey an idea of the stupendous industry of England.

also in some of the streams of Kohistan ; but I have not yet received specimens from these districts ; the report however, is not at all improbable, and I believe myself it will be found all along the line of greatest elevation of the Hindoo Kosh and Indian Caucasus.

Whether this gold occurs originally in a disseminated state throughout the strata from which it is detached, or whether there exist distinct repositories of the metal, and in connection with some of the beds of iron, which from the iron sand that accompanies the gold must be intersected by the streams, is a subject for future inquiry. To the best of my recollection, all the gold brought to London by the Brazilian Mining Company is found accompanying iron, whether in the alluvial deposits from which it is washed, or the mines where it is worked.

Specimens without number have been brought to me from various parts of the country, supposed by the golden hue of the one, and the silvery whiteness of the other, to belong to the precious metals. In none, however, have I been able to recognise any thing beyond the sulphuret of iron under different forms, and a compound perhaps of sulphur, arsenic, and iron. There are some specimens, however, respecting which I am not quite certain, and these I shall transmit for chemical examination. Having nothing but my blowpipe apparatus to depend upon, when any doubt exists as to the constitutions of a mineral, it is desirable that they should be subjected to the test of analysis. On one occasion I tried a specimen from a deposit in Dobundee, (the ore externally has the appearance of an ore of silver,) and I saw a small head which appeared not unlike impure silver, but since then I have repeated the trial frequently without coming to any satisfactory result. The fragment of a mineral, however, which is submitted to the action of the blowpipe is so very minute, being no larger than a grain of pepper, that I should not wish these attempts to be considered final. Argentiferous arsenical iron is worked in Germany as an ore of silver, and should that metal be discovered in this country, it will probably be found in combination with some of these ores, or what is still more likely, with some of the numerous veins of lead which are to be met with.

Amongst all the specimens of iron pyrites, which have been brought to me, I have seen nothing that could be termed curiferous. Latterly, I have heard several reports of the existence of silver, but the Afghans are so addicted to the marvellous, and so easily imposed upon by designing alchemists, that I would never attach the smallest credit to them, unless a specimen of the mineral be produced. By all accounts, the Huzareh country must be the richest in minerals of any other in Afghanistan, from the number of old mines said to be there, and the remains of ancient cities in their neighbourhood, which would seem to indicate, that its mineral wealth in former times had been the cause of attraction. Whether silver may exist amongst these mines, is a point to be ascertained.

A story was told me lately by Aga Hoossain, a merchant of Herat, that at Mough in the Eimough or Eimouk country, there is an inscription in the Hebrew character, on a large black slab, to the effect, that in the days of king Jumshed, (1274 years ago,) the following mines were discovered :—

3 of Silver,	1 of Copper,
1 of Lapis Lazuli,	2 of Lead,
3 of Iron,	1 of Sulphur.

I doubt the genuineness of the whole story, but there is I believe no doubt of the fact, that old mines do exist there, and what they are, is yet to be ascertained. My informant says that he saw a number of old grinding stones in a stream close by the mines, which are believed to have been used by the ancients for crushing ore. It is reported also among some of the Huzarehs, that a number of golden vessels were discovered once in some of the old mines of their country, and there is a tradition of gold mines having been worked, but that the vein or veins are now lost. To tales like these I attach no importance, further than as a stimulus to, and a necessity for, investigation. I believe, moreover, from the specimens of iron, lead, copper, sulphur, and coal, which have been brought to me from thence, that the whole of that country is a rich mineral tract, and if the precious metals do exist there, as they are generally found in small quantity, it must be remembered, that their discovery is not likely to take place all at once, but to be the work probably of time and patient inquiry. A speck of gold in a piece of quartz may point to a deposit of that metal; or an accidental circumstance, (such as a Populzye chief related to me the other day,) may lead to the discovery of silver: namely, that many years ago small particles of it had been observed in a stone on which a fire had been lighted.

A specimen of cinnabar, (sulphuret of mercury,) was brought to me once by a villager, who said he had found it in the neighbourhood of Sultanpore near Jelallabad; but as I did not find any traces of it in the rocks in that vicinity, the probability is, it may have been dropped there by accident. Cinnabar is a rich ore of quicksilver, it is a production of Thibet, and if it be ever found in this country, it will more likely be discovered in the direction of the Kohi Baba range than elsewhere. I lately heard also of a very heavy red coloured stone, which is used by the natives in that quarter as a pigment, and sent for a specimen of it, but the individual I commissioned has not yet arrived. A person who was returning from that country the other day with a collection of specimens, was unfortunately robbed of every thing he had. Were the Huzarehs any other people, I should conclude from the description of the mineral that was given, and their manner of using it, that it was cinnabar, but they are such a perfectly rude and ignorant race, that I fear it will be found to be simply the red oxide of iron. Should gold dust be ever collected on the great scale, or veins of the precious metals be discovered and worked in this country, a mine of quicksilver would be of great importance for the necessary amalgamation works; but this is at present a very vague speculation.

I have mentioned the existence of copper in the Ghilzye and Huzareh territories, Copper. specimens also from Bagour have come under my notice.*

Lead seems to abound in the Huzareh districts, in Ghorabund of Kohistan, and in Lead. Wurduk. The lead of the former two is of an excellent quality, the latter is inferior, and of a harsher character. The ore is the sul-

* The price of lead in Cabool in time of Dost Mahomed Khan was Rs. 1½ per Cabool seer, at present it sells for Rs. 3.

phuret of lead, and that which I have seen from the Huzareh country, occurs in the form of the carbonate likewise. Lead is also stated to be found in Bungesh, and a specimen of it from the Sufued Koh has been brought me lately.

With regard to antimony, I find that what is sold in the bazar of Cabool as such Antimony. is a sulphuret of lead. Occasionally, perhaps, a proportion of antimony may be combined with it, forming what is called the sulphuret of lead and antimony.

I could not convince a vender of antimony, upon one occasion, that what he brought me as pure specimen of that mineral, was not so in reality, until I submitted a fragment of it to the action of the blowpipe, and on disengaging the sulphur, showed him what excellent lead was produced. Having at the time a small piece of massive sulphuret of antimony in my possession, and which, to the eye of the antimony dealer presented very much the same external character as his own, I then placed a fragment of it in the flame of the blowpipe, and the antimony immediately melted, and was absorbed by the charcoal, giving off the white fumes peculiar to it, and no trace of lead was observed.

That antimony, however, exists in this country, is beyond a doubt. It is mentioned in the report of the late Dr. LORD on Ghorabund as occurring in that district, and I myself saw in the possession of an officer, a mass of pure antimony, which was found in the neighbourhood of Quetta.

Graphite, or plumbago, is a production of this country. I have a specimen of it, Plumbago. reported to be from the vicinity of Kohi Daumun.

Specimens of sulphur have been brought me from the Huzareh country, and it is Sulphur, &c. reported as occurring there in vast quantity. Saltpetre is produced abundantly from the soil. Rock salt I observed in the hills near Jelalabad by the Soorkhah river, but in too small quantity to be worth working; a sample of it from Altamoor also has been sent me, but I do not suppose it is in sufficient abundance there, to be of any consequence. Marble occurs at Mydan, and probably in many other places, but this and gypsum, and minerals of that sort, it will be time enough to direct attention to, when the country has made sufficient progress in the arts, to render them objects of value for economical purposes.

The most important minerals of Northern Afghanistan, are the following:—

Iron. This mineral is found in many parts of the country, particularly in the Huzareh, the Ghilzye, the Bajour, and the Wuzereee territories.*

Lead is found in the Huzareh districts, in Wurduk, and in Kohistan.

Copper is found in the Huzareh, the Ghilzye, and Bajour territories.

* In Captain HERBERT's report on the minerals of the Himalaya, published in the 18th volume of the Asiatic Researches, he makes the following observation in his account of the lead mines:—"A singular fact is, that the ore and reduced metal sell by weight for the same price at Kalsi, the nearest town. I could not learn the reason of this, but suppose that the produce of sulphur pays the expence of reducing the ore." When I read this, I suspected there might be a portion of the ore, known to be argentiferous; but it is evident that the purest is selected at Kalsi as at Cabool, and sold under the general term of *soorma*, or antimony.

Gold is found in several streams north of the Cabool river.

Coal is found in the Huzareh, the Ghilzye, and the Wuzereeh districts.

Sulphur is found in the Huzareh districts.

Here then are materials for commencing the work of civilization in this rude and barbarous region, giving a stimulus to its commerce, increasing its revenues, and affording employment to its indigent, but hardy and industriously inclined population.

A remark has been made, that "the mountains in this world no doubt abound in mines, but that the people must be enlightened before they can be worked." And in what way might I ask, is this period of enlightenment to be brought about? Are these great mineral repositories intended to lie idle in the meantime, to form merely the subject of a scientific theme, and furnish a few specimens for the cabinets of the curious—or, are they designed by an unerring Hand for the great moral end, not only of administering to the immediate wants of the people, but in their very extraction to be the means of exercising their energies, mental as well as physical, improving their habits, and thereby contributing effectually to raise them from the brutal condition into which they have fallen?*

Let this nation be taught the practical manual arts, so as to enable them to turn the productions of their country to account,—let the hand of the Afghan, under the eye of the European, unlock that wealth which is intended for his use,—then may we expect to see the rays of civilization break in upon the moral and intellectual gloom which pervades this darkened land.

* In a casual conversation I had lately with the intelligent Barukzye chief I have alluded to (Oosmen Khan) he observed :—" If the feeling of the English people towards this country be as you describe it, and its various resources receive that attention which it is out of the power of my own countrymen, from their poverty and ignorance to bestow on them, then not only will Cabool become happy and contented, but surrounding nations, on seeing the prosperity of Cabool, will desire of themselves to come under the protection of the English."

Opening of the Topes at the Caves of Kanari, near Bombay, and the relics found in them. By DR. JAMES BIRD.

The Caves of Kanari, situated on the island of Salsette, and two miles beyond the village of Tulsi, are distant twenty miles from the fort of Bombay, and six from Tannah. The made road from Bombay conducts the visitor as far as the village of Vihar, four miles north of which is the mountain where the caves are excavated. They have been described by several travellers, and are noticed, in A. D. 399, by the Buddhist priest and pilgrim "Ea-Hian," who visited the seats of his religion in India, and whose travels have been translated by M. Remusat. The cavern temple is described by him to consist of five stories, each story containing numerous chambers or cells, cut out of the solid rock, and tenanted by Arhats; a description which answers very closely to the circumstances of the Kanari excavations, which rise from the base to the summit of the mountain in six stories, and are connected to each other by steps cut in the solid rock. The kingdom in which they are situated is said to be distant from Kia-shi or Varanasi, two hundred *yojans* to the south, and is called Ta-thsen Dach-chin.

Immediately in front of the large arched cave, and on a ledge of the mountain, some thirty or forty feet below, there are several small *Thopas*, or monumental receptacles for the bones of a Buddha, or Rahat, built of cut stone at the base. These were once of a pyramidal shape, but are now much dilapidated, and appear like a heap of stones. Several years ago I thought of opening some of them, in expectation of obtaining coins or other relics; but found no favorable opportunity until lately, when several lengthened visits, in company with Doctor Heddle, gave me the desired means of doing so. The success of General Ventura, M. Court, and others, in their search after relics from the *topes* of the Punjab and Kabul, gave me additional hope that I should find something worthy of the labour, and I am glad to report, that these expectations have not been disappointed.

The largest of the *topes* selected for examination, appeared to have been one time between twelve or sixteen feet in height. It was much di-

lapidated, and was penetrated from above to the base, which was built of cut stone. After digging to the level of the ground and clearing away the materials, the workmen came to a circular stone, hollow in the centre, and covered at the top by a piece of gypsum. This contained two small copper urns, in one of which were some ashes mixed with a ruby, a pearl, small pieces of gold, and a small gold box, containing a piece of cloth; in the other a silver box and some ashes were found. Two copper-plates containing legible inscriptions, in the *Lath*, or Cave character; accompanied the urns, and these, as far as I have yet been able to decypher them, inform us, that the persons buried here were of the Buddhist faith. The smaller of the copper-plates bears an inscription in two lines, the last part of which contains the Buddhist creed inscribed on the base of the Buddha image from Tirhut, and on the stone extracted from the *Tope* of *Sarnath*, near Benares; an excellent commentary on which will be found in Mr. Prinsep's Journal for March and April 1835. The last part of the Kanari inscription, and the copper-plate of which I have now the honor of laying before the members of your Society, corresponds very closely with the text of the inscription from Tirhut. The original in the *Lath* character stands thus :

Yé dhaurmáhetu prabhavá, tésham hétu Tathagatá suvacha Tésáncha
 yo nirodha évam Vádí Máhá Suwanna :
 which transferred to Devanagrí

येधर्महेतुप्रभवास्तेषांहेतुस्तथागतः । सूवाचतेषां निरोध एव
 वादी महासूवर्णः ॥

may be translated :—“ Whatever meritorious acts proceed from cause, of these the source *Tathagata* (Buddha) has declared; the opposing principle of these the great One of exalted birth, has also demonstrated.”

The only difference between the text of the present inscription and the one from *Tirhut*, is the last word *Suwanna*, the *Pali* for *Suvarna* instead of *Sramana*; and which means the *golden one*, or *one of an exalted birth or tribe*, and is here evidently an appellative of Bhuddha. In the appendix to Mr. B. H. Hodgson's quotations in proof of his sketch of

Buddhism, one of the principal attributes of Adi Buddha is सुवर्णवर्णता *Suvarna-warnata*. The above sentence, as Mr. Hodgson remarks, contains the *confessio fidei* of the Buddhist, and is in the mouth of every one at Kathmandu. The discovery of it at Kanari confirms an opinion long prevalent, that the cave temples of Western India are exclusively *Bauddha*, and seems to strengthen the theory regarding the origin of the *Déhgopes* of Kanari, *Manikyala*, and Afghanistan, that they are *Bauddha* Mausolea, built over the remains of persons of this faith, either of a royal or priestly character. Little doubt can exist of the ashes found in the two copper urns being those of the persons buried, one of whom, according to the larger copper inscription, was the chief of the great *Vihar*, or large arched temple at Kanari. The object of these monuments was, as Mr. Prinsep says, twofold: a memorial of the dead, and in honour of the deity, of which the enshrined saint was only a portion, and as legitimately entitled to be worshipped as the source from which he had emanated, and to which, according to their creed, he could after a life of virtuous penance and abstraction return. The monuments in the *Punjab* and *Cabul* appear to be consecrated tombs of a race of princes, who were of the Buddhist faith; whose coins are inscribed on one side with Greek letters, and the other with those of Bactrian *Pali*, and whose tribe is called *Khoranon*. They were a Græco-Indo-Scythic race, mentioned by Marco Polo, and called by him *Karaunas*, a tribe of robbers who scoured the country, and plundered every thing within their reach.*

I abstain now from offering any remarks on the general prevalence of the Buddhist faith on this side of India, or its connexion with the worship of the sun, as my only object is to bring to notice the relics found at Kanari, and their similarity to those discovered in the *Punjab*.

* Travels of Marco Polo by Marsden, page 86.

Literal Translation.

Salutation to *Sarvagna*, (a *Jine* or *Boud'dha*, or deified sage peculiar to those sects.)

This was founded in the year of the reign of the *Trukudaka* line about 100 years at *Bardhamanu*,* 54 on the north, and 85 at *Maha Behar*, by *Pushya Burma*, whose habitation was in the northern forest of the conquered *Taromi*, and who, by his personal beauty, was possessed of a *Buddhistical* appearance as a *Chaitya*,† in honor of the most powerful, very wise, and superior *Bhagavana Sakya*, *Muni*, whose acts were wonderful, and who was the son of *Sārad'dhati*, for the purpose of his studying and practising with firm devotion the famous *Boud'dha* religion, the duty of a learned man.

So long as the revolving waves wherein the *Makara*‡ are swimming at night, the milky water of the *Kshīra Samudra*, (sea of milk,) the *Meru* with its abundant gold and the forest of mangoe—the deep rivers continuing to flow with their clean streams will endure, so long this deed of *Pushya*, which contributes to the advancement of devotion, is durable.

NOTE.—I have most unwillingly kept back Dr. Bird's paper for many weeks, intending to publish it together with a notice of the late Lt. Pigou's Discoveries at Buhurabad near Jullalabad, on the frontier of Afghanistan. I thought the almost simultaneous examination of a set of *topes* situated close to a set of *caves*, giving similar results nearly at places so distant as Buhurabad and Kanari, worthy of being placed in juxta-position, as of interest to the investigator of Buddhist antiquities. I am extremely sorry that great delay in the preparation of a simple lithograph to accompany the Buhurabad paper should have caused the suppression of this interesting paper for so long a time. Having heard a few days ago from Dr. Bird, with the promise of a translation of the inscription on the two copper plates dug from the *Dehgop* at Kanari, copy of which accompanied his paper, I determined on publishing the reading of one of them (subject to correction by Dr. Bird) as given by Pundit Kamalakanta Vidyalanka, and the literal translation of that reading, which I owe to a native gentleman of much learning and intelligence, Baboo Neelratna Holdar of Calcutta. The inscription is numbered xxviii. (and so copied erroneously into the lithograph,) in a work shortly, I am happy to say, about to appear on the Excavations in Western India, originated by Mr. Wathen, well known as a Sanscrit scholar, and carried on by Dr. Bird.



* This country is also mentioned in the 25th *sloka* of the *Pratāpa Rudra* inscription, *Ind. Asiatic Journal*, No 82, 1838, page 906.

† Place of religious worship. This, if the word *druma* be added to it, means a sacred tree.

‡ A horned fish, or a fabulous animal.

Note on a Copper Land Grant, by JAYA CHANDRA.

The copper plate whence the accompanying reading in modern Sanscrit character and translation are taken, was found near Fyzabad in the Oude, and a facsimile of it was forwarded to me by Lieut. Col. Caulfield, then Resident at Lucknow. The land grants of the donor, Raja Jaya Chandra, are not uncommon. In the first volume of the Transactions of the Asiatic Society there is a notice by the late Mr. Colebrooke, (p. 441,) of a grant by this Raja, which is however described at second-hand: "Without having seen the original," says Mr. Colebrooke, "no opinion can be offered as to the probable genuineness of this monument; (date s. 1220, A. D. 1164) the inscription is however consistent with chronology; for Jaya Chandra, who is described in the *Ayeen Acberi* as supreme monarch of India, having the seat of his empire at Canouj, is there mentioned as the ally of Shehabuddin in the war with Prithair Raja, or Pithora, about the year of the *Hejira* 588, or A. D. 1192; twenty-eight years after the date of this grant."

The date of the grant now published is s. 1243, or A. D. 1187, twenty-three years subsequent to that of the same monarch noted by Mr. Colebrooke, and only six years prior to the death of the ill-fated donor, which occurred A. D. 1193. With him expired the dynasty of the Rahtore princes of Canouj.

The genealogy, as given in the grant now before us, differs only in the name of the first ancestor mentioned from that found in Mr. Colebrooke's grant. The name is there *Sripala*, here *Yasovigra*, but the identity of the monarch, known under these different appellations, has been already ascertained, and admitted by the highest authorities, (*As. Soc. Jour.* vol. iii. p. 339).

The phraseology of this grant is not different from those of Jaya Chandra, which have been already discovered: the anathema against the resumers of land granted in free tenure is remarkable for its peculiar bitterness. The plate, judging from the facsimile, must be in high preservation, and the date it gives is valuable, as bearing corroborative testimony to the accuracy of chronological data.



श्री

सस्ति ॥ अकुण्ठोत्कण्ठ वैकुण्ठ कण्ठपीठलुठत्करः । संरम्भः
सुरतारम्भे स श्रियः श्रेयसेस्तु वः ॥ आसीदसीतद्युतिवंशजातच्चा
पालमालासु दिवंगतासु । साक्षादिवस्वानिव भूरिधाम्ना नाम्ना
यशोविग्रह इत्युदारः ॥ तत्सुतोभून्महीचंद्रश्चंद्रधामनिभं निजं । ये
नापारमकूपारपारे व्यापारितं यशः ॥ तस्याभूत्तनयो नयैकरसि
कः क्रान्तदिषन्मण्डलो विध्वस्तोद्धतवीरयोधतिमिरः श्रीचंद्रदेवो
नृपः । येनोदारतरप्रतापशमिताशेषप्रजोपद्रवं । श्रीमत् गाधि
पुराधिराज्यमसमंदोर्विक्रमेणार्जितं ॥ तीर्थानि काशिकुशिकोत्तर
कोशलेंद्रस्थानीयकानि परिपालयताधिगम्य । हेमात्मतुल्यमनिशं
ददतादिजेभ्यो पानांकिता वसुमतीशतशस्तुखाभिः ॥ तस्यात्मजो

मदनपाल इति क्षितौद्रचूडामणिर्विजयते निजगोचचंद्रः । यस्या
 भिषेककलशोद्धसितैः पयोभिः प्रक्षालितं कलिरजः पटलं धरि
 त्वाः ॥ यस्यासीद्विजयप्रमाणसमये तुङ्गैर्वलैश्चलन् माद्यत् कुम्भ
 पदक्रमासमभरद्रश्यन्महीमंडलेचूडारत्नविभिन्नतालगलितस्थानासु
 गुह्रासितः शेषः स्पर्शशादिव क्षणमसौ क्रोडे निलीनाननः ॥
 तस्मादजायत निजो यतवाङ्मवल्लिवन्धावनङ्गनवराज्यगजो नरे
 न्द्रः । सांद्राष्टतद्रवमुचां प्रभवो गवां यो गोविंदचंद्र इति चंद्रइवां
 राशेः ॥ नकथमप्यलभंतरणक्षमांस्त्रिसृषु दिक्षु गजानथ वज्रिणः ।
 ककुभिवन्धुमुरम्भमुवल्लभ प्रतिभटा इव यस्य धरागजाः ॥ अजनि
 विजयचन्द्रोनाम तस्मान्नरेन्द्रः सुरपतिरिवभूत्पक्षविच्छेददक्षः ।
 भुवनदलनहेलाहर्महम्बीरनारी नयनजलजधाराधौतभूलोक्ता
 पः ॥ लोकत्रयाक्रमणकैलिविसुखलानि प्रख्यातकीर्ति कविवर्णित
 वैभवानि । यस्य त्रिविक्रमपदक्रमभाजयति प्रद्योतयति कालि राज
 भयं यज्ञांसि ॥ यस्मिंश्चलत्युदधिनेमिमहीजयार्थमाद्यत्करीन्द्र
 गुहभारनिपीडितेव । याति प्रजापतिपदं शरणार्थिनी भूस्तद्गुरुंरंग
 निवहोत्थरजच्छलेन ॥ तस्मादद्भुतविक्रमादयजयचन्द्राभिधानः पति
 भूपानामवतीर्ण एष भुवनोद्वारायनारायणः । द्वैधीभावमपास्य विग्रह
 रुचिं धिक्कृत्य शान्ताश्रयाः । सेवन्तेयमुदयवधनभयध्वंशार्थिनः
 पार्थिवाः ॥

गच्छेन्मूर्ध्वामतुच्छां न यदि कवलयेत् कूर्मपृष्ठाभिघातः प्रत्यावृत्त
 अमार्त्तो नमदखिलफणश्वासवात्यासहस्रं । उद्योगो यस्य धावद्भर
 णिधरधुनीनिर्भारस्फारधारभ्रस्यद्दानद्विपालीवह्नभरगलद्वैत्य
 मुद्रः फणोन्द्रः ॥ सोयं समस्तराजचक्र संसेवितचरणः सच परम
 भट्टारक महाधिराजपरमेश्वरपरममाहेश्वरनिजभुजोपाज्जित
 श्रीकाण्ठकुब्जाधिपत्यश्रीचन्द्रदेवपादानुध्यातपरमभट्टारक महा
 राजाधिराजपरमेश्वरपरममाहेश्वरश्रीमदनपालदेवपादानुध्यात
 परमभट्टारकमहाराजाधिराज परमेश्वर परममाहेश्वरा ३५
 पति गजपति नरपति राज त्रयाधिपति विविधविद्याविचार
 वाचस्पति श्रीगोविन्द चन्द्र देव पादानुध्यात परम भट्टारक महा
 राजाधिराज परमेश्वर परममाहेश्वराश्वपति गजपति नरपति
 राजत्रयाधिपति विविधविद्याविचारवाचस्पति श्रीविजयचन्द्र

देवपादानुध्यात परम भट्टारक महाराजाधिराज परमेश्वर पर
ममाहेश्वराश्वपति गजपति नरपति राजव्याधिपति विविधवि
द्याविचार वाचस्पति श्रीमज्जयचन्द्र देवो विजयी ॥ असुरेश
पत्तनायां केमलीयामनिवासिनो निखिल जनपदानुपगतानां
राजराजी युवराज मन्त्रिपुरोद्दित प्रतीहार सभापति सांग्रामि
काख्यपटनिक भिषङ्गनैमित्तिकान्तः पुकि द्रुत करितुरगपत्तना
करस्थान गोकुलाधिकारिपुस्तानाज्ञापयति बोधयत्यादिशति
च विदित मस्तु भवतां । यश्चोपरि लिखितग्रामः सजल स्थल स
लौहलवणाकरः समत्स्यकरः सगतेष्वर सगिरिगहन निधानः
समधूकाम्बवाटिकाविटपतृणापतिगोचरपर्यन्तः सोर्द्धाधश्वतु रा
घाटविशुद्धः श्वसीमापर्यन्तः त्रिचत्वारिंशदधिकद्वादशशत स
म्बत्सरे आषाढे मासि शुक्लपक्षे सप्तम्यान्तिथौ रविदिने अंकतो
यपि सम्बत् १२ ४३ आषाढसुदी ७ खौ अद्येह श्रीमहाराणास्यां
गंगायां स्नात्वा विधिवन्मन्त्रदेवमुनि मनुजयुत पितृगणांस्तर्पयि
त्वा तिमिरपटलपाटलपटुमह समुध्म रोचिष मुपस्थायौषधि
पति सकलशेखरं समभ्यर्च्य त्रिभुवनचातुर्भगवतो वासुवस्य पूजां
विधाय प्रचुरपायसेन हविषा हविर्भुजं ज्ञत्वा मातापित्रो रात्मन
श्च पुण्ययशोभिवृद्धये ॥

अम्भोभिराचम्य कुशलतापूतकरतलोदकश्चर्चकभारद्वाजगोत्राय
भारद्वाजाङ्गीरसवाहस्पत्येति त्रिप्रवराय राजतश्रीअटलपौत्राय
राजतश्रीइन्द्रपुत्राय औडराजतश्रीअनङ्गाय चन्द्रार्कधावच्छास
नीलतय प्रदत्तो मया यथादीयमानकरकरपूरनिकप्रभृतिनियतानि
यतसमस्तआज्ञाविधेयीभूयदास्यन्तीतिभवन्ति चात्रश्लोकाः ॥

भूमिं यः प्रतिगृह्णाति यश्च भूमिं प्रयच्छति ॥ उभौ तौ पुण्यक
र्माणौ नियतं स्वर्गगामिनौ ॥ शंखं भद्रासनं च्छत्रं वराश्रवा वरवार
णाः ॥ भूमिदानस्य चिह्नानि फलमेतत् पुरन्दर ॥ षष्ठिवर्षसहस्रा
णि स्वर्गे वसति भूमिदः ॥ आच्छेत्ता चानुमन्ता च तान्येव नरके
वसेत् ॥ वज्रभिर्वसुधा भुक्ता राजभिः सगरादिभिः । यस्य यस्य यदा
भूमिस्तस्य तस्य तदा फलम् । स्वदत्तां परदत्ताम्वा यो हरेत् वसु
न्धरां । स विष्टायां क्रिमिर्भूत्वापितृभिः सह मज्जति । तडागानां
सहस्रेण वाजपेयशतेन च । गवां कोटिप्रदानेन भूमिदत्ता न मुञ्चति ।

वारिहीनेष्वरणेषु शुष्ककोटरवासिनः । कृष्णाहयाश्च जायन्ते
 देवब्रह्मस्वहारिणः । न विषं विषमित्याहुर्ब्रह्मस्वं विषमुच्यते । विष
 मेकाकिनं हन्ति ब्रह्मस्वं पुत्रपौत्रिकं ॥ वाताम्बविभ्रममिदं वसुधा
 धिपन्थमापातमाचमधुराविषयोपभोगाः । प्राणास्तृणायजलविंदुसमा
 नराणां ॥ धर्मः सखा परमहोपरलोकयानि । यानीह दत्तानि पुरा
 नरेन्द्रैर्दानानि धर्मार्थयज्ञस्कराणि । निर्मात्यवान्तप्रतिमानितानि
 को नाम साधुः पुनराददीत ॥

Literal Translation, by Pundit SARODAHA PRASADH.

1. May the embrace of Lakshmi, (* * * * * and Vaikuntha,) contribute to your prosperity!
2. The Rajas who were descended from the *lunar* line having departed for heaven, one, named *Yasóvighraha*, by his natural spirits was as the sun himself.
3. His son was *Mahi Chandra*, who extended his fame as beams of the moon across the sea.
4. His son was *Chandra Deva*, who was exceedingly given to justice, who invaded the whole circle of his enemies, and dispelled the darkness of the gallant warriors. He, by the power of his arms, gained the kingdom of *Gádhipoora*, where all sorts of insurrections have been quelled by his power.
5. He, (*Chandra Deva*,) who protected the sacred places of *Kashi*, (Benarus,) *Kushikotsava Kóshalá*, (Oude,) and *Indrasthána*, possessing them, who constantly gave gold equal to the weight of his body to the *Bráhmaņas*; made the *Vasumatí*, (earth,) renowned by the hundreds and hundreds of *túlás*.*
6. His son *Madanapála*, who was like the moon in his line, and the crest-jewel of all the Rajas, was glorious! By the water of his anointment, all the filth of the *Kaliyúga* has been washed away.

* A religious ceremony, i. e. giving gold or silver to the *Brahmanas*, equal to the weight of the donor's body; the ceremony is in these days often practised by weighments against grains, or precious merchandise. It is supposed to be efficacious in awarding evil, and was constantly had recourse to by Maharaja Runjeet Sing, (Lahore,) in his last illness.

7. At the time of his expedition for conquests, when the earth was as it were crumbling under the over-passing of his furious elephants, as well as his mighty army, the mouth of *Sesha*,* smeared with blood gushing from the palate pierced by the pressure with his head jewel, was for sometime bent down even to his breast.

8. From him was born *Gobinda Chundra*, like the moon rising from the sea, who by his arms, long and like the creeping plant, kept the newly, acquired kingdom—stubborn as the elephant in confinement; nay, who granted a great many cows yielding sweet milk.

9. His elephants, rivals to that of *Indra*, having sought in vain in the three quarters of the world for elephants, capable of bearing their burdens, came at last in the quarter of *Indra*, (east,) and wandered there-along.†

10. From him was born *Raja Vijaya Chandra*, who like *Surapati*, (Indra,) cut off the *Pukshus* of all the *Bhubhrit*‡. He at his easy conquest of the world, has extinguished the heat of the earth by the abundant tears of * * * *

11. His renown challenging the three regions of creation described by eminent poets, and which reached as far as the *Vishnu loka*, (region of *Vishnu*,) has been ever the terror of *Vali Raja*.§

12. The earth, at the expedition of *Vijaya Chandra* to conquer the whole world crushed by his furious elephants, ascended, as it were, in the dust caused by his numerous army, to solicit refuge from *Prajapati*, (*Brahma*.)

13. From him who was possessed of wondrous power, sprung one named *Jaya Chandra*, the lord of all Rajas, who was as the *Naráyana* himself, born only for the deliverance of the world; and whom the Rajas humbling themselves ceased from contemplating hostilities with, and putting a stop to their designs, submitted to.

14. At the preparation of his warlike affairs, the *Phanindra* (the chief of serpents,) wearied with falling down and again rising from the hard shell of the *Kurma*,|| under the pressure of his elephants the ichor from whose temples dropped into the streams, running from the

* The chief of serpents, supporting the earth on his head.

† With the view of finding there the rival elephants of *Indra*.

‡ The word *paksha* means when relating to *Indra* the “peaks of mountains;” and “allies” when referring to the *Raja*. The word *Bhubhrit* has also a double meaning, “the mountain” and “the (other) Rajas.”

§ *Vali Raja*, v. the *Srimat Bhāgavata*.

|| The tortoise supposed to reside underneath the earth.

shaking hills, and panting from his thousand hoods with impatience, would without sustenance have fainted, and died.

He, the glorious *Jaya Chandra*, whose feet were adored by the circle of Rajas, and who was like *Vachaspata** in discussing on various *Vidyás*, (sciences,) the lord of the three Rajas: viz., *Aswapati*, *Goyapati*, and *Narapati*, very rich, king of kings, learned and superior to all, and who was devoted to the feet of (his father) *Vijaya Chandra*, who also was like *Vachaspati* in discussing, &c. and devoted to (the feet of his father) *Govinda Chandra*, who also was, &c. and devoted to the feet of (his father) *Madanapála*, who also was, &c. and devoted to the feet of (his father) *Chandra Deva*, who was also very learned, king of kings, &c. &c. and who gained the kingdom of Kanyakubja by the power of his arms. That proclaims and orders to all the inhabitants of *Kemali*, the village situated at *Ashúreshapattaná*, to all the rajas, princes, ministers, priests, attendants, chiefs of assemblies, warriors, (*akshapálikas*) physicians, and servants, who were occasionally to attend to the female apartments, superintendents of elephants, horses, mines, cows, &c.

Be it known to all of you, that this day, the seventh day of the moon, in the month of *Ashádha* of *Samvatsara* 1243, we, for promoting the virtue and fame of our parents and ourselves, having performed ablution in the Ganga at Benares,—satisfied as usual, the *Gods*, *Munis*, men, together with deceased ancestors, with offerings of water, adored him whose fervid beams dispel darkness, worshipped him who wears the crescent on his forehead (*Shiva*), and *Vásudeva* (Vishnú), offered oblations to *Hútáshana* (Fire) with *Páyasha*† and performed *Achamana* with water, then granted with water in hand to *Alonga Ouda Ráyuta*, who belonged to the Bháradhája line, and was possessed of three Provaras, viz. *Bharaddája*, *Angirasa*, and *Várhaspatya*, and who was the son of *Indra Ráyuta*, and grandson of *Atala Ráyuta* with a *Sáshna*, (grant) village above-mentioned (*Kemali*) which was enriched with water and earth, with mines of iron and salts, with ponds full of fishes, with caves and fertile farms, mountains and forests, with gardens of modhu and mango trees, and which extends as far as *Trinayuthi*, and the four boundaries of which were undisputable. It is ever to be enjoyed so long as the sun and moon will endure. Its revenues, as settled, or are to be settled, are duly to be discharged by the tenants.

* The Guru of the Gods.

† Rice boiled with milk and sugar.

Slohas.—He who grants lands, and he who accepts, both of those virtuous reside in heaven.

O, *Purandara*, (Indra.) *Sankha* (shell) houses, ensign of ranks, (chattah) fine horses and elephants, are gained by granting lands.

He who grants lands lives 60,000 years in heaven; but he who confiscates, or resumes, or allows others to do so, is doomed to hell for a like period.

The earth has been enjoyed by many kings, as *Ságara* Raja, and others, and he who rules it in his turn is the sole enjoyer of its fruits.

He who resumes lands granted by himself or others, is to become a dung fly and to live therein with his ancestors.

The resumer of lands can never be free from sins, though he grants a thousand tanks, a crore of cows, and performs a hundred *vajapeya* (a sacrifice.)

Those who resume lands granted by others, will become black serpents in the desert of the forest of the *Vindhya* mountain. No poison is of itself utter poison; but to deprive a Brahman of his property is indeed poison, because the former can kill one alone, but the latter the whole of a man's descendants.

Sovereignty is unstable like the wind; worldly pleasures are in the first instance desirable. The life of man is as a dew-drop on the grape, but, alas! virtue is the only friend who accompanies him into the next world.

But what generous man will resume the grants made by Rajas, who have gone before him, and whose gifts are like wreaths of flowers spreading the fragrance of a good name and of a reputation for wealth and virtue?

Lineage of Jayachandra.

Yashovigraha.

Mahichandra.

Chandra Deva.

Madanapála.

Gobindachandra.

Vijayachandra.

Jayachandra,
the donor.

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Abstract Journal of the Route of Lieutenant A. Cunningham, Bengal Engineers, to the Sources of the Punjab Rivers.

From Tandee on the Chundra Bhaga river, where I parted with Lieutenant Broome, I continued my way along the right bank of the river, with the proud consciousness that I was the first European who had ever visited that part of the Chundra Bhaga. On the 16th of July, 1839, at sixteen miles below Tandee, I crossed the river by a wooden bridge called *Rocha*, or the 'Great' Bridge, 85 feet long and 43 feet above the stream, to the left bank, where I once more came upon fir trees which I had not seen for a week. After a walk of two miles over a dusty bad pathway, I had to climb a steep hill on which the celebrated temple of Triloknath is situated. On the road I passed a Hindoo Pilgrim, a Gosain, who had come from Sunam in the protected Sikh States, having visited Jwala Mookhee near Kangra, and the various hot wells at the head of the Parbuttee river.

The temple, which is situated at one end of the village of Goonda, is square, and is surmounted by the *trisoal* or trident of Siva, who is Triloknath, or, The Lord of the three worlds, Heaven, Earth, and Hell. There was an open Court to the front with a two-storied verandah of wood; the pillars, architectraves, and rails being all richly carved. In the middle of the Court there was a block of stone about 6 feet square by 5 feet high, on the top of which was growing the sacred plant *Tootsee*, or Basil. The figure of Triloknath was of white marble, about two feet

high, with six arms ; on its head there was placed a small squatted Buddhistical looking figure which the attendant Brahmin declared to be of Anna Pooroos, probably meaning Anna Purna, the beneficent form of Parvati, the wife of Siva. In the Court there were many tall poles surmounted by cow's tails and pieces of cloth, placed there as offerings, by Tibetan Buddhists as well as by Brahminical Hindoos.

The village of Toonda in which the Temple of Triloknath is situated, had been overwhelmed in snow in the preceding year, 1838, when all the houses which had not been bonded with wood, had fallen down, and killed the inhabitants. The Rana or Chief of Toonda Triloknath is under the authority of the Rajah of Chumba, to which state the lower portion of Lahul belongs.

The province of Lahul embraces the whole breadth of the Chundra and Bhaga rivers, and extends down their united streams called the Chundra Bhaga in a W. N. W. direction to about ten miles below Triloknath. It is divided into two unequal parts ; the larger belonging to the state of Kooloo, and the smaller to Chumba. In the former there were 108 villages, containing 740 houses, and 3,764 inhabitants.

The revenue of the province is derived from two different sources ; a house tax, and a duty on the carriage of merchandize. Under the Rajah's administration each house was taxed at 10 and 12 rupees, but the Sikh Government increased the tax to twenty rupees per house, by which they raised the collections from 5,000 to 10,000 rupees per annum, the houses of the priests and poorer labourers being exempted from taxation. The rates of toll were at the same time adjusted by Zurawur Singh, the governor of Ladakh, the duty upon each carriage sheep being raised from half an anna (or three farthings) to four annas, (or six pence.) This was considered very oppressive by the people, but as a sheep can carry 8 and 10 seers, or one fourth of a man's load, the fair and natural rate of duty would be to charge one fourth of the duty levied upon each man ; and Zurawur Singh did no more, for a man is charged one rupee. On a pony which carries from 60 to 70 seers, or double the load of a man, the duty levied is likewise double or two rupees per pony.

The grain raised in Lahul is all consumed in the country ; and as there are no natural productions, the house tax is paid by the inhabitants from the joint Stock, obtained by hiring themselves as porters between the states in the lower hills of the Punjab and Ladakh ; the porters who bring goods from Kooloo, Mundee and Chumba being changed at Tandee for natives of the province itself, who receive 6 rupees cash, for the journey to Ladakh. The hire of a pony to Ladakh is 12 rupees.

The articles taken to Ladakh are :—wheat and rice from Chumba ; Iron and Opium from Mundee ; coarse white cottons, and Benares brocades of the worst quality from Kooloo ; with goats skins dyed red, chiefly manufactured at Bissowlee and Noorpoor in the Punjab—in exchange for which the following articles are brought to Tandee to be sold to the merchants of the neighbouring states. Shawl Wool ; Bang, or Hemp prepared for smoking ; silver in wedges, each wedge called Yamoo, weighing 180 rupees or $4\frac{1}{2}$ lbs. avoidupois ; Borax, native of Ladakh ; Salt, manufactured at some Salt lakes beyond Ladakh ; and Tea, brought from Yarkund.

For the two previous years, however, but little trade has passed through Lahul, on account of the seizure of Ladakh by the Jummo family, who have established a high road through their own territory of Jummo, which throws all the duties upon the traffic into their power. The route runs from Jummo, through Chinénee and Bhudurivar, both in Forster's route to Kishtwar, and thence to Chutogurh and Ladakh. The whole of these places, and consequently the entire route, are in the possession either of Gulab Singh or of his brother, Dhecan Singh.

The consequence of this change in the direction of the commerce had been so prejudicial to Lahul, that about 500 people had emigrated to other countries ; and many more would have followed them had they not been stopped at the Custom houses established on all the passes leading from Lahul. Another consequence of this interruption of the traffic had been that very little or no Salt had come to Lahul, for the two preceding years ; and of this the people complained bitterly, as well as of the loss of their hire as porters between the lower hills of the Punjab and Ladakh. Many of them were literally starving, having nothing to eat, except grass, willow leaves, and strawberries. Even the attendant Brahmin of the holy temple of Triloknath was glad to get the remains of my Mahomedan Munshi's dinner.

There are four passes leading from Lahul into Chumba, all of which were described as equally bad. Of these the Dogee Pass leads from the village of Ruppoo, about 8 miles below Tandee, over the snow, and down the course of the Boodhil river to Burmáwar. The other passes lead from Triloknath. The upper one is called the Bugga Pass and leads direct to Burmáwar ; the lower is the Humguree Pass, and is very little used, and the middle is the Kalee Joth, or Pass of Kalee Débee, which I chose.

On the 18th of July, I quitted Triloknath, and on the following evening reached the foot of the Kalee Débee Pass, so named from a

black conical peak to the South, dedicated to Kalee Débee. The place was called Hoolyas, in Sanskrit Hoolyasaca, and was merely a resting place at the foot of the pass; there I shot some snow pheasants and Alpine Hares. On the following morning I began the ascent of the pass up steep banks of loose angular masses of rock, and over sloping snow beds, down which fragments of rock came bounding and dashing along with a crash like the rattling of continued and numerous file-firing. The porter who carried my iron tentpegs was struck on the knee by one of these stones, and hurled before my eyes down the sloping indurated snow. Luckily the snow bed terminated in a fork between two mounds of broken fragments of rock, and there the man's further progress was stopped, and his life saved. He was lame however for three weeks afterwards. The crest of the pass was a narrow ridge not more than ten and twelve feet wide, covered with soft and newly fallen snow. There I spread my cloak and found by my thermometer that the height was 15,700 feet. In the middle of the ridge there were two small slabs erect and smeared with vermilion, near which were numerous sticks covered with rags. For a few minutes I had a splendid view of the green hills of Chumba smiling in the distance. A thick haze then descended and obscured even the terrific gulph below, and I commenced the descent without seeing where I was to halt for the night. A goat was sacrificed by my servants to the Goddess Kálee, and to that they attributed my safety as well as their own. The descent was 5,000 feet to the spot where I halted, at the head of the Nye river, one of the principal tributaries of the Ravee.

On the 21st of July, I continued my journey, following the course of the Nye river for seven miles to the village of Loondee, below which I crossed the river and halted at the Dhurmsala, or traveller's house. The next day I reached Burgaon, a large village on the left bank of the Nye, and was much cheered with the sight of a mulberry tree; and there I got some good wheat flour, some excellent milk, and fine honey. On the 24th I passed through Footahun, below which the Nye and Boodhil rivers join the Ravee, to Poolnee; and ascending the Boodhil river for five miles I crossed it by a very respectable wooden bridge, 68 feet in length and 98 feet above the river, with a railing, knee high, on each side. There I saw wild grapes and mulberries just beginning to ripen—and continuing my journey for an ascent of 1,500 feet, I reached Burmawar, or Vermmawura, the ancient Capital of the Verma family of Chumba, 7,015 feet above the sea. The spot was a beautiful one; but the severity of the winter had no doubt led to its being abandoned as a capital for

several centuries. The tall spires of the stone temples, and the profusely carved wooden temples were completely shaded by cedar and walnut trees. One Cedar was 20 feet in circumference. There were numerous stone pillars, tradition said 84, dedicated to Siva; and a large brazen bull, the size of life, under a wooden shed, besides 'several travellers' houses. The figures in the temples were of brass and exceedingly well executed, all bespeaking a very ancient origin. I copied three Sanscrit inscriptions from the brazen figures, recording the names and families of the donors.

On the 29th of July, I left Burmawur, and at four miles reached the village of Khunn, opposite Tootahun, where the Nye and Boodhil rivers join the Ravee. From thence the road descended for 1,500 feet to the Ravee, which was rushing between steep cliffs of black clay slate; I crossed it by a birchen rope bridge 116½ feet span and 60 feet above the water: the points of suspension were at different heights, and the fall of the curve in the middle was 20 feet, which made the ascent and descent extremely difficult and dangerous. From the bridge, I had to scramble amongst loose stones, and up steep banks for an ascent of 2,000 feet in a distance of two miles, when I reached Woolas, on the left bank of the Ravee, opposite Khunn and Tootahun, at the junction of the three rivers, which I was surprised to find was not considered holy. The three streams were about equal in size; but the Boodhil is the one held in most esteem, as one of its sources is in the holy lake of Munnee Muleés—its other principal source is from the Dogee Pass, on the road from Tandee to Burmawur. The Nye River has its principal source in the Kalee Débee Pass; but a considerable feeder called the Raim River, joins it from the Bugga Pass. The Ravee itself rises in Kooloo from the Bungall Mountain, and runs in a N. W. direction to Woolas, where it is joined by the Nye and Boodhil.

From Woolas, I followed what is called the royal road, or that used by the Rajahs of Chumba when they make their pilgrimages to Munna Muhe's. It was one day's journey out of the way, but as it ascended the higher spires of the mountains, I chose it for the sake of the more extensive view, which I should obtain, and for the sake of the survey, which I was making. In three days, I reached Chaitraree, where was a temple to Sugget Débee. The figure was of brass with four arms; and on the pedestal was an inscription, recording the donor's name, which I copied. On the next day, I reached Bussoo, and on the following day Mahila; and on the 4th of August, I crossed the Rancee by a birchen rope bridge of 169 feet long, stretching from an isolated rock on the bank to the Cliff

opposite, and reached Chumba, the Capital of the state of the same name.

Chumba, or Chumpapoor, the Capital of Chumba is situated on a level piece of ground on the right bank of the Ravee, at an elevation of 3,015 feet. There is a tradition that the river formerly covered the Changaun or plain of Chumba; which is certainly correct, for the plain is formed of large boulders of slate and granite, mingled with rich earth above, and with coarse sand below. There are nine good temples in Chumba; none of them, however of such beautiful workmanship as those at Burmawar. The Rajah's Palace is an extensive building, but it cannot boast of any beauty. The houses are not different from those usually seen in the hills; and I was altogether much disappointed with Chumba.

Of seventeen purgunnahs, through which I passed I have a detailed account of all the different villages, amounting to 258, containing 1,672 houses, and 8,849 inhabitants. These seventeen Purgunnahs form about one-eighth of the whole country; which must, therefore contain, with the addition of 800 houses, and 7,000 inhabitants in Chumba town, 14,176 houses, and 77,792 inhabitants. The villages on the lower course of the Ravee are however much larger than those upon the higher streams, and I am therefore inclined to rate the population at nearly 100,000; of whom perhaps 10,000 may be exempt from paying the house tax—the remainder, 90,000, living in 12,500 houses, will give a revenue of 2,50,000 rupees, if taxed as usual at 20 rupees per house.

The trade through Chumba, formerly considerable, is now very little, owing to the opening of the new route, through Jummao; Customs are, however, collected at Bhudewar, which forms the North Western boundary of Chumba, and through which merchants occasionally pass, and merchants who come to Chumba, sometimes carry goods by the Sajah Pass and Chutegurh to Ladakh; but the traffic is comparatively trifling; and I do not therefore value the amount of Customs collected at more than 50,000 Rs. yearly, making a total revenue of 3 lakhs of rupees, or £30,000.

There are no natural productions exported from Chumba, save rice and wheat to Ladakh; and the manufactures are considerable: the principal are thick woollens called Burmawur, manufactured in pieces eleven yards long, and fifteen inches wide, in all the colder parts of Chumba. Some are carried to Kooloo for sale, and I have seen a few pieces at Simla. Coarse Alwans, or Shawl Cloths, are made in the town of Chumba from Ladakh Wool, but they are all used in the country.

The men wear a long sleeved white woollen cloak, fastened round the waist with a black woollen rope; and on the head a peculiar peaked cap

of thick white woollen; the women wear the same cloak, only black, with a white rope round the waist; and a small scull cap on the head—the men's dress is a very picturesque one.

From the Rajah's Pundit I obtained a long list of the Rajahs of Chumba, beginning with Brahma of course, and descending through the Surajvansa to Sumitra, after whom the list appears to be less apocryphal. The earlier Rajahs are said to have resided in Burmawar.

On the 11th of August I quitted Chumba, crossing the Ravee immediately above the town by a birchen rope suspension bridge, of 187 feet span; and with much difficulty made my way to the village of Kurédh. One of my porters in crossing the small stream, now swollen by rain, lost his footing and was drowned. On the 13th I reached the summit of the pass of Chuarhoo, 8,041 feet high, from which I saw the plains of the Punjab indistinctly through the clouds. In the evening I reached the large Village of Chuarhee, where I halted. On the following day I made a fatiguing march of $4\frac{1}{2}$ miles to Jajeree, on the bank of the Chukkee River, over several high ridges of stiff gravelly conglomerate, alternating in strata with sandstone. The next day I crossed the Chukkee River with some difficulty, by swimming. It was 200 feet across and about 5 feet deep in the middle, and the rounded boulders at the bottom afforded no footing whatever; after a little ascent and descent I came upon a large open plain, which I crossed to Noorpoor.

Noorpoor is a fine flourishing city, 1,924 feet in height, built upon a narrow ridge of a sandstone rock, curving to the North; the houses are chiefly of squared stone; and the main street runs over the solid rock. The city was founded upwards of two hundred years ago by the celebrated Noor Jehan, the beautiful empress, who established a number of Kashmerians in it. In 1839 there were said to be 7,000 Kashmerians in Noorpoor, who were chiefly employed in the manufacture of Shawls. I saw many of the Shawls, which were decidedly inferior to the real Kashmerian Shawls, this was attributed to the difficulty of getting the finest wool. The Noorpoor shawls are however of very fair workmanship, and they are brought in great numbers to Simla, Delhi, Lucknow, Benares, and Calcutta.

On the 18th of August I left Noorpoor, and crossing the Chukkee River, I reached Puthankot in the plains of the Punjab at an elevation of 1,205 feet above the sea. From thence I passed through Shujanpoor, a good sized straggling town, and crossing the Umritsir and Lahore Canal near its head, I reached the bank of the Ravee, which was nearly a mile in width. The passage was made in about an hour by boat, and I halted

at a large straggling town called Ruttooa, from that passing through Heeranugur, Chunghee Marhee, Mudwar Harmunder, Barha, and Pullee, I reached the bank of the Tohi, the Jummoo River which was rushing along deep and red, having been swollen by heavy rain in the lower hills. There I was detained until the evening, as no boatman even with a bribe would venture his boat in the rapid current. At Jummoo I occupied an upper room in a gateway prepared for reception by Golab Singh's eldest son, Oodhum Singh, who was lately killed at Lahore.

The town of Jummoo is about the same size as Noorpoor, but it contains fewer inhabitants, as there are no two storied houses in it. A few Shawls are manufactured at Jummoo, but they are made to order and not for general sale. Rajah Oodhum Singh treated me kindly enough; but my servants were watched, and I was unable to procure any information of value, I therefore quitted Jummoo as quickly as possible, and crossed the Chenab river 10 miles below Aknoor, near where Taimoor had crossed it. The main stream was 920 yards wide, rolling swiftly on with a strong current. There were besides six other channels, some of them breast deep, and all having a rapid stream; and beyond these was the river Tohi, which, rising in the Rutun Punjall mountains, flows by Rajaoree, and joins the Chenab above Wazeerabad. It must have been between this river and the Chenab that Alexander had pitched his camp about the same season of the year; for Arrian says, 'The flat country is also often overflowed by rains in summer, insomuch that the River Acesines, having at that season laid all the adjacent plains under water, Alexander's army was forced to decamp from its banks, and pitch their tents at a great distance.'

The Tohi, frequently also called Toh, is, I have no doubt, the Tutapus of Arrian, a great river, which falls into the Acesines, for the Tohi of Rajavree runs in a direct line upwards of 80 miles, and where I crossed it near Mumaivur, at the same season in which Alexander had seen it, it was a great river running deep and red. It was full of quicksands, and the passage was dangerous as well as tedious. On the 3rd of September I reached Bheembur, at the foot of the mountains on the Royal Mogul road to Kashmere.

On the 5th I proceeded to scale, what Bermier called that 'frightful wall of the world,' the 'Adi Duk' or first range of mountains. On the top of the pass I saw a gibbet with two cages containing the skull of Thums and his nephew, the chiefs of Poonch, who had for a long time resisted the encroachments of the Jummoo family. A price was set upon their heads by Goolab Singh, but from their known bravery no one dared

attack them openly ; and they were at last killed, while asleep, and their heads carried to Goolab Singh, who ordered them to be suspended on the crest of the Bheembur pass. The next day I crossed the 'Kumaon Gosha' mountains, or 'sharp ridged bow,' the range being narrow at the top and bent at each end like a bow. Thence passing through the Serais of Noshehra, Inayutpoora, Changez, and Muradpoor, I reached Rajaoree on the 8th of September. The Rajah was very attentive and communicative, and I received much interesting information from him. I also procured a history of the country, and some orders by Aurungzebe, and Nadir Shah ; besides a copy of a grant of the Rajaoree territory, by Bahadoor Shah ; since then the territory has been seized bit by bit by the Jummoo family, until only a small circle of 20 miles diameter now remains to the present Rajah.

In the grant given by Bahadoor Shah, the revenue of Rajasore is stated to be 77,77,960 dāms, equivalent to 27,799 Rupees, which with the Customs collected, must have been increased to 50,000 rupees. The territory now is about one fourth of what it was at that time, A. D. 1708, and the Customs have nearly ceased, as the Sikhs give free passes for all their own merchandize ; the present revenue cannot therefore be more than 10,000 rupees, which was the sum stated to me by many respectable natives.

The chief crops in Rajaoree were rice and maize ; the maize invariably occupies the higher grounds, and the rice fields the level alluvial formations along the river ; these were kept constantly flooded by streams conducted along the hill sides from the neighbouring torrents. Height of the city, 2,800 feet.

The hills between Bheembur and Rutun Punjall are all of a coarse greyish sandstone, alternating with loose gravelly conglomerates near Bheembur, and gradually changing into a siliceous state in the Rutun Punjall range,—at the foot of which there are large blocks of conglomerate in compact masses cemented firmly together.

I left Rajaoree on the 10th of September, and after an easy march of eight miles over a stony road, I reached Thunna ;—from whence to the crest of the Rutun Punjall the road was good, but steep. The crest of the pass, I found to be 7,350 feet in height ; from whence there was a noble and extensive view, over the low hills of Rajaoree, of the distant plains of the Punjab. From thence the descent was through a thickly wooded forest of walnut, elm, horse chestnut, and pine trees to the bank of the Bahramgulla river, which I crossed by a bridge, and proceeding up one of its tributaries, I halted at Chundee-murg. Rain had fallen heavily for some days previously, and the small stream had swept away

all its bridges, so that I had some difficulty in making the numerous crossings, which the road took. One of my goats was swept away by the rapidity of the current. The ascent of the Peer Panjall was extremely steep, but the road was good and wide, having been repaired by order of the Sikh Government. My thermometer gave 11,224 feet as the height of the crest of Peer Panjall Pass. From thence the road was a gradual descent for $2\frac{1}{2}$ miles to the Serai Aliabad, built by Ali Murdan Khan; height 9,812 feet. A little below Aliabad the road was narrow, but quite safe, a parapet wall having been built on its outer edge overhanging the torrent below. The place is called Lala Ghulam, after a slave who superintended the work, and whom Ali Murdan is said to have afterwards sacrificed and buried there. Beyond that, the road was good and broad, occasionally ascending and descending to an open piece of ground, called Doojan, below which I crossed the torrent and proceeded along a level pathway to the Serai of Heerpoor. The next day I passed through Shoopyen, and crossed the Shoopyen river, reached Ramoo ke Serai, where I halted; and the next day, 15th of September, I entered Kashmere city, having been three months and two days from Simla.

The city of Kashmere is situated on both sides of the river Behut, at an elevation of 5,046 feet above the sea. I am aware that Baron Hugel made the height 6,300 feet, but Jacquemont calls it 5,246, and Moorcroft says, that the *general* level of the valley is about 5,000 feet. It is of an irregular shape, the greater part being on the right bank of the river; about one fourth of the houses are deserted; but the city must still contain about 80,000 inhabitants.

The information which I have collected regarding Kashmere is not yet completely arranged, so that I cannot give any general results. I may state, however, that I have a list of all the villages in the valley; a minute account of all the passes, including those which are used only for contraband trade; the history of the Shawl Wool from its first starting from Radakh and Khantan (or Changtang) to its arrival in Kashmere, where it is spun into thread, dyed, and woven into Shawls. I have besides ten or twelve specimens of Kashmerian songs translated into English verse; and a very good collection of the coins of the Hindoo Rajahs of Kashmere preceding the Mussulman conquest.

Additions made to the Geography.

I will conclude with stating the additions, which the joint travels of Lieutenant Broome and myself have made to the Geography of the Alpine Punjab.

Of the Sutluj.

1. The whole course of the Spiti river, one of the principal branches of the Sutluj, has been surveyed by Lieut. Broome.

Of the Beas.

2. The whole course of the Teerthun river, one of the principal feeders of the Beas, has been jointly surveyed as well as the Beas river itself, from its source to its junction of the Teerthun river, in addition to which, the mountain course of the Chukkee river has been laid down by Lieut. Cunningham.

Of the Ravee.

3. The whole course of the Nye river, with a portion of the Boodhil river, and also of the upper Ravee, with the further course of the Ravee, after the junction of the Nye and Boodhil rivers as far as Chumba, have been surveyed by Lieutenant Cunningham.

Of the Chenab.

4. The whole course of the Bhaga river, has been surveyed by Lieutenant Broome; the source of the Chundra by the same officer, and the greater part of its course jointly by Lieutenants Broome and Cunningham; and the course of the joint stream of the Chundra Bhaga, as far as Triloknath, by Lieutenant Cunningham. The greater part of the course of the Tohi river, a principal feeder of the Chenab, has likewise been surveyed by the same officer.

Of the Thelum.

The Shoopyen river, which rises in the Peer Punjall, has been surveyed by Lieutenant Cunningham.

Of the Indus.

The source of the Yunam Choo, or Yunam river, a large tributary of the Indus, has been laid down by Lieutenant Broome.

(Signed) ALEXANDER CUNNINGHAM.

1st Lieutenant of Engineers.

Lucknow, 8th February, 1841.

*Extracts from Demi-Official Reports.—By Capt. ARTHUR CONOLLY
on a Mission into Khorasan, (communicated to the Editor from the
Political Secretariat.)*

The Huzarah and Eimauk Country which we traversed between Bameean and Meimunna, consists of high unwooded mountains, covered with grass and various shrubs and herbs which serve for spring and summer pasture, and winter fodder, and vallies at different elevations, in the highest of which is grown only the naked Thibetan barley, and in the lowest barley, wheat, and millet.

The Huzarah portion is the coldest and poorest, and the natives with difficulty eke out a living from its natural resources; living in small villages of low huts where they herd during the long winter season under one roof with their cows and sheep, and using as fuel small dry shrubs and the dung of their cattle. An idea of their privations may be formed from the fact that the most of the people do not use *salt*. There is none in their own country, and as they cannot afford the price which would remunerate importers of this heavy article from Tartary and Afghanistan, they have learned to do without it. Their best bread is consequently very tasteless to a stranger.

But the Huzarabs are not allowed to enjoy even their limited means of existence in peace, for the Oosbegs make occasional inroads upon their dwelling places, and sweep away whole villages into slavery, leaving fertile spots desolate. Their neighbours, but religious enemies, the Eimauks, also carry off as many of them as they can, from time to time, conquer or kidnap, and the chiefs of their own race, steal each other's subjects in their petty wars, exporting all they can thus obtain, through Toorkish merchants with whom they have understanding.

We found the Huzarah people unblushing beggars and thieves, but they are mild mannered and industrious, and sigh for the protection of a settled government. Were this given to them, their condition would soon improve in every way. Their chiefs are 'barbarians of the rudest stamp, without any of the barbarous virtues.' They reside in small mud forts, exact as much as they can from all who come within their reach, and form occasional combinations for the defence or attack of each other. The Eimauks differ chiefly from the Huzarabs in being of a more nomade habit, the chiefs consult their dignity and safety, by dwelling in mud forts, but the people reside nearly the whole year in the dry stick and felt tents which are used by the Toorkmans. The chiefs, like

the Huzarah meers, have their feuds, which continually break them up into parties against each other. The people are bolder than the long oppressed Huzarahs, and will get together to attack travellers whom they would rather only attempt to rob privately.

The Soldiers of both tribes are cavalry, mounted chiefly on small active horses of native breed, though some ride horses imported from Toorkistan. Their arms are swords, and matchlocks, the last weapon furnished with a prong for a rest. There are clans of military repute among both people. Their strength lies in the poorness and natural difficulty of their country, but the last defence is I imagine greatly overrated. Parts of the interior are described as much more steep than that which we traversed, but this portion, which is the most important, as being on the high road to Herat, is by no means so inaccessible as it has been represented.

Neither among Huzarahs or Eimaiks is money current, and sheep form the prime standard of barter with the traders who come among them from Afghanistan, and Tartary. These Merchants establish a friendly understanding with chiefs of different districts, to whose forts they repair and open shop, giving their hosts $2\frac{1}{2}$ yards of Kerbus, or coarse narrow cotton cloth, for the value of each sheep received in barter; and being furnished till their bargains are concluded, with straw for their beasts, and generally bread for themselves and their people. Traders from Herat, Candahar and Cabul bring their checked turbans, coarse cotton cloths and chintzes, tobacco, felt, and carpet dyes, iron spades, and plough ends, molasses and a few raisins. Toorkish Merchants bring similar articles from their own country, with a little rice, cotton, and salt, occasionally horses, which they prefer to exchange for slaves.

The articles which the Huzarahs and Eimaiks bring to market, are men and women, small black oxen, cows, and sheep, clarified butter, some woven wollens for clothing, grain sacks and carpet bags, felts for horse clothing, and patterned carpets, all made from the produce of their flocks, for they export no raw wool. They also furnish lead and sulphur, and the Eimaiks especially speak of copper and silver mines as existing in their mountains, but they do not work them.

Agha Hoosseini, a Native of Herat, who had long traded among the the Huzarah, and Eimaik clans, occupying our route between Bameean and the border of Meimunna, negotiated our passage with a safe guard the whole way for 1,200 Rupees, and we marched with him from Bameean on the 23rd September 1840, escorted by 80 Huzarahs under a son of Meer Sadik Beg, a leading chief in the district of Deb Nangre. Our road

took us in 3 marches over spurs from the main ridge of Hindoo Koosh (Koh-I-Baba) to the fertile and well inhabited valley of Yaikobung, which has the breadth of from $\frac{1}{4}$ to $\frac{1}{2}$ a mile, in a length of 15 miles, and is well watered by a clear trout stream from the famed 'Bendemir,' which flows on to Bulkh.

We slept the first night in the cold damp valley of Shebbertoo, which, according to the boiling point of a Thermometer, is about 10,500 feet above the level of the sea. The mercury at sunset stood at 37° ; in the course of the next $\frac{2}{3}$ of an hour it fell to freezing point, in fact before sun rise next morning it was down at 10° . The residents say that they have 5 months winter, which commences late, but is every rigorous, and the deep snow which falls, is not all off the ground two months after the vernal equinox. The rest of the march brought us to the valley of Fuor Behar, about 2,100 feet lower than Shebbertoo, where the barley crop was not all ripe, and the Thermometer showed about 11 degrees difference of temperature. The third took us 8 miles down the valley of Yaikobung, 1,100 feet still lower, where the people had just got in their crops of fine wheat.

The present chief of Yaikobung is Meer Mohib, a vulgar and coarse man. He put Shah Shoojah's letter to his head, and came to pay his respects to us as the bearers of it, when we gave him a suitable present. Having taken leave, he sent to beg for my furred cloak, and on my giving his messenger a note which would procure him one from Bameean, he sent to say that he must have my girdle shawl and 1,000 rupees, and he would permit us to depart. We were too many to be thus bullied here, therefore replying that the Meer seemed to misunderstand our condition, we marched away at once without his daring to interrupt us.

West of Yaikobung, the main ridge of Hindoo Koosh sweeps round to the northward, after which turning westward again, it forms the northern boundary of the hills which slope down to the right side of the Heriroad valley. Our fourth march took us by a very steep defile across this ridge, from the base of which we descended through a deep valley, about 5 miles westward, to the fountain head of the Heriroad a clear pool of gently bubbling springs, where the boiling point shewed an elevation of 9,500 feet, 1,100 higher than the bed of the stream flowing northward from Yaikobung.

We followed the course of the Herat river, in its clear, quick wanderings through different breaks of the limestone valley, which forms its bed, for four marches, the first taking us to the head quarters of Meer Sadik Beg in Dab Yungee. This chief, who is a vulgar but well

disposed man, treated us very hospitably, neither he or his sons read the Shah's letter, but having heard it perused, he stuck it in the top of his turban, and declared that he was His Majesty's servant to do any thing that lay within his limited ability. We remarked that the chief service His Majesty required from the Huzarah Meer was to keep their people loyally quiet, to which Sadik Beg replied, that he should be truly glad to be quiet, both on the king's and his own account, if some of his Huzarah neighbours and Eimauks, would only let him.

We expected to have found awaiting us near this post the Eimauk escort which our guide had engaged from Mahomed Areem Beg, the Atalik of the Ferookohee clan; but we found that in the interim the Atalik had been persuaded to march with an Eimauk Army against Hussun Sirdar, a powerful chief of the Dah Koondie Huzarabs, and that we must in prudence await instructions from him, or an end of the war. This Sadik Beg said would not last long, as the Eimauks had gone in such numbers, that they would not keep the field for the want of provisions, and the danger he most feared for us, was, our meeting some of these returning troops ere we got the Ataliks safeguard. Our guide therefore went off to the head quarters of the latter chief and finding there one of his sons, persuaded him to come to our camp. The young Eimauk chief arrived at night, and nothing would induce him to go beyond my Meerzas tent.

The Huzarabs, he said, were his sworn enemies, and were capable of any atrocity, why should he put himself within their reach in the dark. Next morning he went up to the fact on Sadik Beg sending him a solemn oath of friendship, and they presently came in a cordial manner together to consult with us about the onward march. The son of the Atalik said that he would give an answer in his father's name to any Eimauks who might come across our road, and as he appeared to be an unvapouring person, he resolved to proceed with him at once. Sadik Beg accompanied us one march with a large body of horse, as he had heard that a party of Huzarabs, from another near Chiefship, had marched to intercept us, turning back at the end of his district, between which and the Eimauk border a few miles of the valley are left waste. Our reported enemy, the Chief of Sal, met us here with 100 horse, and said that he had ridden to our assistance, on the intelligence that Hussan Khan of the Tymunnee Eimauks had occupied the road ahead, with the intention of plundering us. We understood this to be a demand for a present, so adding to our thanks a Cashmere

shawl, we marched on, receiving from our way side acquaintance a parting caution to put no trust in any Eimauk.

We safely concluded this day's march of 12 miles, which brought us among a quite different people. In point of personal appearance the advantage was certainly on the side of the Eimaux, who though living closely after the nomade fashion of Toorkmans and Oosbeks, have the features rather of Darrians than Tartars. The Feroorcokchs indeed claim descent from a Colony, which was exported from Feroorkoh, in the Persian province of Mazenderan. We encamped upon the right bank of the Henrood, among people of this clan, half a mile off on the other side of the river was the fort of Dowlut Yar, surrounded by villages of Tymunnee tents, to which we learned that Hussan Khan had returned the day before, apparently without having entertained any idea of barring our road.

The war, we learned, was ended. It had its origin in an act of violence committed 9 years before upon the very Agha Hossein attending us as guide, then travelling with a stock of goods from Herat to Cabool, who was plundered by the former chief of Dowlut Yar, for preferring the quarters of our host the Ferozkohce Atalik. The latter Chief not being able with his domestic means to force a restitution of the goods taken from his protégé, allowed Agha Hossein to call upon his Huzarah friends for succour, and the leading chief of Deh Koondee, Hussan Sirdar, glad to indulge a national dislike while defending a commercial privilege which it concerned every Chief, whether Eimauk or Huzarah, to uphold, came with such a large force that he took the lead in the operations against Dowlut Yar, having captured and utterly rased the fort; after killing its Chief and his eldest son, he gave the old man's, wife to his own brother, and took his daughter to himself, returning home only, when he had captured another fort nearer the border, and placed a party of his own men therein. Agha Hossein got all his goods that could be recovered, and so retired. But now the Atulik regretted the loss of Eimauk reputation to which he had been accessory, so he countenanced a stratagem by which the border fort was recaptured, and having helped to rebuild that of Dowlut Yar, brought back the old chief's second son, the present Hussan Khan, to inherit it. The latter had just before our coming persuaded most of the Eimauk Chiefs, including his father's first adversary the Atalik, to make an attack upon Hussan Sirdar of Deh Koondee, for the cleansing of their national reputation. The quarrel was accommodated in a way to make the Eimaux appear superior, by the

Deh Koondee Sirdar's restoring the arms which he had taken from Hussan Khan's father and engaging to give 2 or 3 daughters to the heir and his relatives, to close the blood account.

Agha Hossein our guide, who thought it well to remove all ill blood from Hussan Khan's heart for the excusable share that he had in the past disasters, went to Dowlut Yar, with a koran, on which he declared before witnesses that he absolved the chief from all obligations to repair his former losses, and called upon him to say in the same solemn way that by-gones should be by-gones. The Chief consented, and accepted a present which we sent with a letter to his address from Shah Shoojah, but his manner on both occasions was so sullen that our guide resolved to give him the least possible opportunity of doing us an injury.

The Atalik arrived in our camp next morning, and speaking with confidence about our road forward, sent us on with a small escort under his brother and son, while he went to get back from Hussan Khan a horse stolen from our pickets which had been traced to Dowlut Yar. When we had got 2 miles down the valley we were met by 60 horsemen, who called out to us to stop and pay zucut. The Atalik's brother riding a head, and explaining that we were envoys on the King's affairs, and not traders, our waylayer replied that we had paid our way to others, and why not to him. 'They are guests of the Atalik' exclaimed his brother, 'and by God and the Prophet they shall not give a needle or a Chillum of tobacco.' 'Then by God and the Prophet we will take it', rejoined the robber; whereupon he ranged some of his men in line to face us and caused others to dismount upon a rock behind and to set their guns in rest. We lost no time in getting ready for defence, but the Atalik's brother riding out between our fronts, called a parley, and drew a line which neither party was to pass till peace or war had been decided on. Three quarters of an hour was consumed in debate, which was thrice broken by demonstration of attack and by the end of this time 30 or 40 men of the same tribe had collected on foot from a rear encampment, with the evident intention of making a rush at our baggage in the event of our becoming engaged in front. We had despatched several messengers to bring up our host, and just at the affair had assumed its worst look, a cry was raised that he was coming. Looking back, we could see horsemen pouring out like bees, from the tents surrounding Dowlut Yar, and all hastening in our direction, but while our Eimank escort exclaimed that the Atalik was coming in force to the rescue, our opponents cried out in scorn that Hussan Khan was coming to help them to plunder us, and each party.

raised a shout for the supposed reinforcement. After about 10 minutes of the most intense anxiety during which we and our opponents, as if by mutual agreement, waited to see whose conjecture was right, we were relieved by the arrival of the Atalik, who galloping up ahead to us at the utmost speed, exclaimed that he had brought Hussan Khan to our defence. The announced ally was not long in following with 300 men, and our enemies were made to understand that they must abandon all idea of attacking us. Hussan Khan declaring that we were envoy's recommended to him by the Shah whose slave he was, and that he would allow no one to molest us. It seemed pretty clear that the Atalik had wrought this loyal zeal in Hussan Khan's mind, and probably, from the delay which had occurred, that he had not found the task easy; but 'twas not a time to scrutinize very particularly the motives which had brought us a defender, so we gave Hussan Khan the politest credit for his professions, and at evening sent him a handsome shawl from the Atalik's fort, with a promise that we would not fail to represent his conduct to the Shah.

We arrived that evening without further adventure, at Badgah in Cheghehezan, a fort in the Herirood valley which is the family seat of the Feroozkohee Atalik, and we shewed our appreciation of the service which this chief had rendered us by giving a very handsome present to him, besides gifts according to their degrees to his brother and other relations.

We were detained 4 days at Badgah, first in consequence of the Atalik's indisposition, and then in order to get rid of a neighbouring chief connected with him, Kurar Beg of Surusghar, who threatened to attack us in our very camp near the Atalik's fort unless we paid him black mail, his right to demand this, he said, lying simply in his power to enforce its payment. After causing us several alarms, Kurar Beg listened to the remonstrances of the Atalik, the aid of our host being necessary to protect him from another more powerful chief whose son he had murdered in his own house, and he came to pay us a visit, attended by 200 followers.

We now left the Herirood valley, ascending 3 miles through the hills on its northern side to a ridge running parallel with it, and proceeding 8 miles further to the northward over an undulating down to the summit of the main ridge of Hindoo Koosh, which we crossed by the easy pass of Shategh i Ghilmee. It is not higher to the eye than the ridge first noted, and there are higher looking masses to the northward, but our guides said that it rose again both east and westward, and their defini-

tion need not be disputed, for the springs on one side of this trunk flow to the Herirood, and on the other towards Tartary. We descended from it to a deep and rapid brook called the Tungan; which led us 4 miles down with the cultivated valley of Ghilmee to the mouth of a deep and close pass called the Derah i Khurgoosh, or the Hare's defile, where the boiling point shewed an elevation of 5,200 feet, about 400 feet lower than our last station in the valley of the Herirood.

Friday 9th October. Quitting camp at 9, 15, we followed the brook Tungan into the Hare's defile, commanding the road at the second of 3 angles. In the first 500 yards, was a brick wall with holes built up like a screen upon a not easily attainable portion of the rock, which we were told was anciently erected to help the collection of transit duty. We next went $13\frac{1}{4}$ miles between bare perpendicular mountains of limestone, the defile running in acute zigzags which for the most part were not more than 50 or 60 yards long, and having but breadth enough for a path, and for the brook which we were continually obliged to cross. Burnes, I see, states that after crossing the Dundan Shikan, he travelled on northward to Khoollum between frequently precipitous rocks which rose on either side to the height of 300 feet and obscured all stars at night, except those of the zenith. I am afraid of exaggerating the height of the cliffs between which our road here lay by guessing at their height in feet, so will only say that their precipitous elevation made our horsemen look like pigmies as they filed along their bases in the bed. After this very narrow portion, the defile widened to the breadth of 50 yards, but it presently contracted again to that of thirty, which may be stated as the average width of its onward windings for nearly 5 miles, where the Tungan discharged itself into the river Moorghaub, which came from the east, in a bed of good width, through a similar deep pass. After creeping along the bottom of the defile for the first $2\frac{1}{2}$ hours of our march, we ascended some way up the side of the left mountain, and followed the bends for the next hour and a quarter by a narrow path worn upon its slightly sloping edge, a tangled thicket now occupying all the spare bed of the stream, to which we descended again $\frac{1}{4}$ mile before its junction with the Moorghaub. The Tungan is a deep brook before its entrance into the Hare's defile. In spring, what with the increase of its waters from melted snow, and and their compression between the sharp turnings of the narrow defile, there is no passage from side to side, except such as is afforded for a footman by means of a spear laid across its rocky banks. The distances noted afford a very imperfect description of the quantity of ground that must

be traversed by a traveller through this defile. An idea of its windings may be formed from the facts, that our baggage ponies were nearly 4 hours creeping along a distance for which my observations afford a direct line of $6\frac{1}{2}$ miles, and that the portion of our road which lay in the bed, crossed the stream 34 times.

What is called the Derah i Khurgoosh ends at the junction of the Tungan with the Moorghaub, but the narrowness and difficulty of the pass continues for a mile further down the left bank of the latter stream, which we forded where the water was up to our ponies' shoulders, running at the rate of, I should imagine, $3\frac{1}{2}$ miles per hour. A steep road, which laden ponies take, ascended a little above the entrance of Derah i Khurgoosh, which comes down again just below the junction of the two streams.

Afterward the pass opens out into a warm little valley of 250 yards width, called Taitak, or under the mountain, at the end of which we halted near some Eimauk tents. Hence we turned off northerly from the Moorghaub, and ascending by a moderate steep pass to the top of the hills enclosing its right side, proceeded on a gentle rise over an undulating surface that gained to a small grassy vale lying at the foot of a higher pass. Here we had an unpleasant scene with the greedy relatives of the Atalik accompanying us, who announcing their intention to take leave, demanded presents extravagantly above any claims that they could prefer for reward, and by their united clamour hindered all endeavours to moderate their claims made by our host, to whom alone were we strictly bound to give any thing. After I had gone out of the way to satisfy these beggars, they went off as if they were the party robbed, and I have no doubt that they incited the attack which was made upon us the next day.

October 11th. Quitting camp at 10, we ascended $\frac{1}{4}$ mile up a rocky pass to the spring head of Misrec, which waters a small grassy level in the enclosure of the pass where we found an Eimauk encampment. The pass upward from this little platform was steepish, though on an equal ascent, and the path was tiring, lying over small loose fragments of slaty limestone which had fallen from the shelving bases of the decomposed cliffs on each side. The defile above the spring gradually narrowed in an ascent of about $13\frac{1}{4}$ miles, which our laden ponies were 40 minutes accomplishing, to a point at which the steep rocks, enclosing it almost met, leaving a short passage through which 3 horsemen could ride abreast. Our foremost riders had nearly reached this point when a number of armed men rising with shouts from their ambuscade above it and on either side

of us, began with one accord to pelt stones at us and to fire their guns, those who were on our flanks also loosennig pieces of rock which came bounding down the shingle bank with force enough to bear away any thing occupying the path. Fortunately the cafila was far enough behind to avoid the first of the attack, and we retreated to an open part of the pass, where, making ourselves masters of the shelving bank on each side, we entered into negotiation with our assailants ahead. After much time had been lost in parley, our aggressors agreed to take a few pieces of chintz and 40 rupees (as we had no more goods) and invited us to advance, but we had scarcely reached the old point, when our envoy sent with the cloths and cash agreed to, came running down to us stripped and beaten; and the attack upon us was renewed. Our skirmishers having kept the shelving flanks, we had not to retreat far, and having briefly consulted on turning again, we decided that there was nothing for it but to force our way, so advancing with our best musquet men on foot, while those left with the cafila followed in close order, firing over our heads at the cliffs above, we in less than 10 minutes made ourselves masters of the narrow passage, from which our enemies retreated over the hills. Some of our men and horses were severely bruised by the stones which were raised upon us during this push, but 20 boxes were broken, and the only gun shot wound that could be found was in the cloak of one of my Hindoostanee servants. I am happy to believe that none of our cowardly enemies were killed or seriously wounded, for we found no dead men on the rocks taken, and they retreated too fast to carry off any who were much disabled.

We were 40 minutes more ascending to the summit of the pass, but the defile was comparatively open above the narrow passage, the rocks on each side being low and rounded. We here took leave of the Atalik who had come after us on hearing that we were attacked. I believe him to be about the best man in his country.

We rested at evening in the small valley of Hushtumee, where we found officers collecting the tax of one sheep in forty for the Walee of Meimunna. Our next two marches were over the mountains of the Hindoo Koosh, from which we made a steep descent, leaving the mouth of the defile by which they are entered nearly 6 miles S. E. of Meimunna, to which we proceeded through a fertile valley bounded by low and round earthy hills, the stream which we had followed from the foot of the mountains irrigating countless vineyards and gardens, the walls and trees of which concealed the town till we were inside it.

Somes miles before reaching Meimunna we observed a sign that we were approaching a slave mart, for an old man who rode out from a small encampment to offer his horse to us for sale, said that he would take a young male slave and a pony for it. We told him that we were not men sellers, and asked him if he was not ashamed to deal in the Khulk'Oollah. (God's Creatures.) He replied that he could only do as every body round him did, but that he did not require the actual slave, only the value of one, shewing that men are here a standard of barter as sheep are among the Huzarahs. Herattees, this old broker said, were comparatively speaking a drug in the market, owing to the quantity that the vuzeer of that city had exported. Huzarahs were so so, and the only captives that would now fetch a good price, were the young men and girls of Roum and (*illeg. in MS.*) or other real Kuzzilbashees.

Mirrab Khan was out upon his annual battu when we arrived, but his brother gave us excellent lodging, where our people and horses were daily provided with every thing that could be desired. The Walee returned on the 4th day of our detention, and courteously visited us the next morning, when after presenting to him Shah Shoojah's letter and a dress of honor, I quite won his heart by giving him a double barrelled percussion gun, he being passionately addicted to field sports. We went the next day to return his visit, and the following is my note of the interview.

Mirrab Khan bade us frankly welcome, and ordered in breakfast of bread, fruit and salted cream tea, of which we partook together, our servants carrying off parcels of fine green tea imported from Yarkund, and large loaves of Russian refined sugar, which were set before us upon large platters of dried fruits, as the host's offering.

I could not obtain certain accounts of Mirrab Khan's revenue, for he keeps no regular duster. My Meerza witnessed this irregularity for years, and used to remonstrate with Mirrab Khan about it, when the chief would reply that it was not the Oosbeg way to take particular account of what came and went, a saying confirmed by report of the laxity, which prevails in the financial department of Khiva, and even in that of the more formally organized government of Bokhara. Mirrab Khan expected to be furnished with means for all his expenses by his Dewan Beggee, who was able to do this without murmuring, after getting in half of the Walee's due from the inferior officers, through whose hands it came. I have roughly calculated the Walee's annual expenses at 10,000 tillas, or 80,000 Caubul rupees, which supposing my preceding conjecture right, would give him a fair revenue of a lakh, and a half of

rupees, but this might be increased very greatly, if any thing like system were introduced into his government. It is said at Meimunna that Ahmud Shah imposed a tax of one toman upon each of 360 ploughs, belonging to as many villages in this district, then registered under Aumilders, for the support of Hajee Khan's Mehman Khanah. Those ploughs were understood to be used for the cultivation of lands watered by natural streams, (there are no kuhreezes in this country), and something more than 3 times their produce was said to be raised from Daimee land or soil watered by the heavens. If we allow 15 khurwars for the crop of one plough, we have 5,400 khurwars for the stream lands; 3 times this for the rain crops would be 17,200 khurwars and the total 22,600 Ditto. The country is certainly now better populated and cultivated than it was at the beginning of the Dooranee monarchy, so a guess may be made at the least amount of its agricultural produce, but I cannot pretend to determine this. Much again is exported from this province to the Eimauks and Huzarabs, and, latterly, to Herat. In cheap times a kharwar, or 100 muns, of wheat is sold for a ducat; we only get a third of this quantity for the same money.

We made 5 marches to the southward of west, via Alma, Keisu and Charshumbel from Meimunna to the rise of the Moorghaub encamping on its bank at the fort of Karoul Khaneh's a few miles below the fort of Bala Moorghaub which we did not see. In view upon our left during these 5 marches was the northermost ridge of the Hindoo Koosh mountains from which we descended behind Meimunna. Our road lay upon easy rises and falls through hills of a light clayey soil, enclosing many well watered vallies and glens, in which is cultivated wheat, barley, millet, sesame, flax and cotton; vineyards and gardens flourish about the villages at the chief of which brisk little fairs are held twice a week for the convenience of the country round. It is a fruitful country which only requires more inhabitants, and I learn that the districts on towards Herat, as well as those under the mountains eastward of Meimunna, are of similar character.

We found our road to Karoul Khazeh safe, but vigilantly watched by patrolling parties detached by the Walee of Meimunna, the Jemsheiddee tribe, and the Soonnee Huzarabs of Killah. Several cofilas passed us, going to Bokhara with merchandize, or to Meimunna for grain, and we met single Toorkmauns riding horses to Meimunna which they designed to exchange there for slaves. On the 4th March, when we had passed the ruined fort of Kaornach, anciently the Jemsheeddee border mark, we were met by a young chief of the latter tribe, who thinking that our influence might avail him at Herat, complained that he had been driven

from his home by Mahommud Zeman Khan, his more powerful rival of the same clan, who on sending a party of those who had followed him, to cultivate land near Nerochok had fairly seized their crops, driven off their cattle and sold 25 persons to the Toorkmauns. This confirmed the statement which we had heard at Meimunna, and which we soon ceased to doubt that the Soonnee religion is no longer a safeguard against captivity. Every defenceless person who can be used for labor is carried off to the insatiable markets of Tartary. We were followed by a small cafila of slaves from Meimunna consisting of Sheah Huzarabs and Soonnee Eimauks, of all ages from 5 to 30.

We forded the Moorghaub at Karoul Khaneh, and our onward march lay along or near its left bank for 8 marches to Merve. The first took us past the rather imposing, but desolate mud fort and citadel of Merochak. Many mud pillars, which were formerly used by watchers of crops, yet stand among the weedy bushes that have overrun the chief portion of this now deserted valley, and the land retains many traces of the industry with which it used to be irrigated. In parts high weeds have sprung up thickly where flood water from the Moorghaub has been allowed to settle, and its stagnation in those marshes is doubtless the chief cause of the malaria which makes this district uninhabitable during the heat of summer. The next wide break of the Moorghaub valley below a broad belt of low dry hills which bound Merochak, forms the head of the division called Punjdeh extending 20 miles down to a point where the stream of Kooshk joins the Moorghaub, which although it contains weedy vegetation in standing water on one side, is well inhabited by Tookmauns, who are evidently in a flourishing condition. They breed many horses which they profitably export; and they find pasture for large flocks of sheep, and herds of camels in their range of the valley parts of which they cultivate with jewaree wheat and barley.

These Toorkmauns are a colony of the Ersaree tribe from the banks of the Oxus, divided into 4 clans, called Oolle Zuppeh, Kureh Shughsee, and Chunghee which they estimate in round numbers at 500 tents each.

At Punjdeh we laid in 5 days' dry provisions for ourselves and horses, there being no encampments upon our road or along the Moorghaub to Yellatoon. The right of the valley, which the river favors, is for nearly all through bounded by a well defined line of low hills. The left, near which our road lay, was sided by hillocks and undulations than positive hills. On the 2d March we first observed sand lying upon the hill as if drifted by northerly winds from the desert, and a third of our onward way lay, over loose beds of sand that covered portions of the hard white clay soil,

which forms the proper surface of the country as far as Merve. The bank of the Moorghaub upon which we halted each night, was thickly fringed with Tamarisk bushes. The water of the river was very muddy, flowing ly with eddies at the rate of one and a quarter mile per hour, and having many dangerous quicksands. We very nearly lost a man who rode his horses a little way in to drink. Though we met no tents we saw vast flocks of sheep which are sent thus far from Merve to pasture with a few shepherds and dogs. We carried chopped straw upon our horses, being accustomed to it, but there was no want of grass on the way for the native horses of our fellow travellers who had not gone to this expense. The road is by no means difficult abounding as it does in grass, wood and water, and it was evidently well travelled formerly.

Our third march brought us to a very fine caravansary of burned bricks, containing accommodation for many men and beasts, which is attributed to Abdoolah Khan of Bokhara a philanthropist who has the credit of all good works in these countries, as Alle Merdun Khan does in Affghanistan. Close to it is a mausoleum sacred to the memory of some Imaum forgotten.

Despatch from Lieut. H. Bigge, Assistant Agent, detached to the Naga Hills, to Capt. Jenkins, Agent Governor General, N.E. Frontier, communicated from the Political Secretariat of India to the Secretary to the Asiatic Society.

I have the honor to report my arrival at this Post, (Demalpore) where I am happy to state large supplies of grain, &c. &c., are now daily arriving for the use of the troops about to accompany me to the Naga hills.

Having been prevented, from the total want of population on the road between Rangalao Ghur and Kasirangah, of Mehal Morung, from passing up that line of country, I crossed to the north bank of the Burrampooter at Bishnath, and passing through the villages of Baghmaree, Rangalli, Goopore, and Kolah Barri in the Luckimpore district, crossed the Maguli Island to Dehingeahgong, and so through Deergong to Cacharri Hath, where I fell in with the detachment of the Assam Lt. Inf. which Captain Hannay had sent off, to await my orders at Nogorah.

From Cacharri Hath I passed to the Phunseri river at Golah ghaunt, where I was glad to find that the greatest portion of the supplies of rice, &c. dispatched by me from Nogong, had all arrived safely, and

that a large portion had been sent forward; the remainder was speedily transferred to smaller boats, and is now close at hand, having been brought by water to a small river called Daopani, one march on this side Hir Pathor, (Bor Phalong of Captain Pemberton's maps) and from whence a path through the forests had been previously cleared to the nearest point to this.

From a demi-official letter, received at Golah ghaut from Captain Hannay, I was led to believe that large supplies had been collected for the use of his detachment at Nagorah, but in this there must have been some mistake, as the Jemadar in command informs me, that, but very little rice has been collected, and not much more may be expected at present.

Never having previously relied on any other arrangements than those I made when at Nogong, but little, if any delay will result from this circumstance; and the detachment was ordered to leave Nagorah on the 1st instant at latest, and will, probably, should the heavy rains we have had not detain them, arrive here on the 5th or 6th instant.

I remained 3 or 4 days at Golah ghaut, superintending my arrangements, and was present at a sort of fair, held there, on the arrival of a fleet of boats, laden with cotton from the Lotah Nagah Hills on the Dogong river, which falls into the Dhunsini a short way above; about 70 of the Nagas came down, with two of their sykeats, many of them understanding the Assamese language, and were engaged the whole day in bartering their cotton, for salt, dried fish, dogs, fowls, and ducks, with a few brass rings, of which they seem very fond, suspending them one below the other from holes bored in the ear.

The general average of prices was about

1 Seer of Salt	4 to 5 of Cotton.
1 Dog	3 (they eat this animal.)
1 Fowl or Duck	1½ to 2.

On visiting their camp a little above the ghaut, I found several of them lying on the ground, intoxicated from the effects of a most disgusting sort of spirituous liquor they make from rice, and which they drink hot; they are a very sullen race, and it was with some difficulty I could get any replies to the few questions I asked them.

Regarding the madder, with which the hair on their spears was dyed, I tried a long time to gain some correct information, but in vain, the Sykeah told me, they had none in their own hills, but what they used was brought to them by the *Ahor Nagas*, a tribe I have not yet heard of, but believe it will be found to mean the Amgamees, of whom they seemed to stand much in dread, and from whom they said they received

a large portion of the cotton, they brought down for sale, acting, it would appear from this, more as merchants than the actual growers.

The country of these Abors, they described as being due south from their hills, but they said distant 2 months' journey, an obvious error, as such a distance would take them far to the south of Munnipore. As the name of this tribe was also made use of by the Rengmah Nagas (inhabiting the hill between those of the makers of Nagong and the Dhunsiri) I may hereafter be able perhaps to make myself better acquainted with their position, though this tribe also seem to fear them fully as much as the Lotahs.

In appearance, the Lotah Nagas are of a short, though stout build, and some of them by no means ill-looking; they wear no more clothing than their brethren of other parts, and are alike filthy in their persons and habits, and have a pompous mode of addressing one, which might in some cases be interpreted as insolent. I shewed them some clasp knives, I took down with me for the purpose, at which they laughed, and sneeringly remarked, 'of what use were they? Naga requires only a *dhan*, and his spears; such things are of no use or value to us:' before quitting this race, I may as well observe that they carry away about 12 or 1,300 maunds of salt annually, in exchange for cotton, so that their trade may be deemed equal to near 10,000 mds. of cotton in all.

There are several merchants, chiefly Kyahs, from Marwar, established at Golah ghaut, besides Musselmans from Goalpara, but so little trade is there for any thing besides cotton, that I was unable to procure a brass pot of any sort; woollens and every other descriptions of cloth are alike unsought for, their stock in trade being composed entirely of salt.

A large quantity of iron being found and manufactured in the neighborhood of Golah ghaut, the Nagas obtain their *dhans* chiefly from hence, the price of which appeared to me very high, being 4 as. each, and the iron fetching as much as 8 Rs. per maund, unwrought; the quantity annually manufactured, I was unable to ascertain.

Leaving Golah ghaut in company with Mr. Herring who had joined me from Bishnath, by appointment, we passed through a long belt of dense forest to the Nambur Nuddie, about 10 miles, for the purpose of visiting together the salt springs, and lime stone rocks, which are found on its banks. The camp was formed for the night on a small sand bank, round which the river ran, and in the centre of which was the salt spring, or, called by the natives, on account of the heat, the *Jucung poong* or hot springs.

The water from this spring is beautifully clear, and of a temperature of $110\frac{1}{2}^{\circ}$ in the well, to $111\frac{1}{2}^{\circ}$ in the sand, as determined by most accurate observation, from a first rate thermometer obtained from London, for such purposes:—this was at 3h. 33m. P. M., the temperature of the air being $59\frac{1}{2}^{\circ}$ at the time, repeating the observations the next morning at 7. A. M. when the atmosphere was at 43° . I found no difference in the temperature of the water.

The water when drank appeared to me to contain but very little salt, and flavored rather of sulphur than any thing else; the spring is a very abundant one, and would nearly suffice to turn a water wheel, but is so little elevated above the level rain, that a rise of only two feet would be sufficient to swamp it, while from the water marks on the trees, it was obvious that the whole was submerged in the rains from 7 to 8 feet.

The neighbourhood of the spring was every where trodden down by elephants, buffaloes, deer, &c. which animals resort there in great numbers to drink the waters, through my own elephant, ponies, &c. refused to taste it; in the centre of the spring there is a depth of about 1 foot of water, below which the feet or hand might easily be passed through a thin bed of sand, composed entirely of quartz to a bed of large pebbles of a similar nature, and it was resting the thermometer on the latter bed that the greatest heat $113\frac{1}{2}^{\circ}$ was obtained.

This spring is situated about $1\frac{1}{2}$ or $3\frac{3}{4}$ of a mile from the Dhunsiri, but in spite of this, I fear the returns would not be worth any persons while establishing a manufactory of salt, as he must leave the place in May, and could not expect to return till November, which would be the earliest date at which these forests could become habitable after the rains.

I boiled a large quantity of water, about 2 gallons, till it was reduced to $\frac{3}{4}$ of a quart, which was afterwards evaporated at Bor Pathor, but not more than a tea-spoon full of salt was obtained, a very poor return, I should suppose, though the salt was to the taste extremely good.

The morning after I reached this spring, as the distance to Bor Pathor, was but short, Mr. Herring and myself proceeded through the forest, along the banks of the Nambur Nuddie, to visit the other springs, and also the limestone beds, distant by the watch $1\frac{1}{2}$ hours, in a S. W. direction. A short way below the springs, in a small stream, running from them, on which the water was pleasantly warm. Mr. Herring's discovered some trees, which struck us both as being tea, though I am uncertain as to the fact, but have sent specimens of the leaves, flowers, and fruits, through Capt. Vetch, to be examined by Dr. Arnott and Mr.

Watkins, as in the event of their proving genuine, would greatly enhance the value of the springs and quarries.

The salt springs which are 3 in number are situated 250 yards to the north of the Nambur Nuddie, in a small circular space, surrounded by forest, but are neither so hot or apparently so strong of brine as that we first saw. The temperature being as follows.

In the shade,	64° air.
Large spring,	95° water.
Smaller one,	98°

The difference between the larger and smaller springs being doubtless caused by a small stream of water flowing into it.

In the time of the Assam Rajahs, it appears, these salt springs were regularly worked, and the water dammed up for the purpose, as the remains of the parts which formed the dams are visible in the stream, which falls into the well, as also in that which carries off the water.

The limestone, of which I send specimens, is found in the bed of the Nambur Nuddie, close to the salt spring, where it appears at the clay; as also in the small stream above mentioned, which runs through the larger spring about 200 yards further up, and beyond which, about $1\frac{1}{2}$ a mile, is found pipe-clay, some detached pieces of which I saw, but had not time, on a second visit to these wells, to reach the beds.

It is a curious fact perhaps, that a large quantity of small fish, inhabit the larger of these wells, and it was a subject of much regret, that I was unable to procure any, as specimens, as it could not but have been satisfactory to ascertain, what description of fish these were, which delighted in such a temperature and in such water.

The only drawback to the effectually working these spring, and lime-beds, for a certain number of months during the year, appears to be the want of conveyance to the Dhunsiri river, and I think it might be worth the experiment of making an outlay, on the part of Government, of 2 or 300 rupees to effect the same, either by cutting a road through the forest, or by erecting *Batahs* (or dams) in the river, so as to allow of its becoming navigable for small boats, which might easily be dragged over the slight falls when empty, and as easily taken down when laden, a practice much in use on the Dying river of Cachar, as you have had opportunity of observing.

Should such a proposition meet with the approbation of Government, I believe Mr. Herring would be happy to devote a considerable degree of attention and minor expense, so as to render these wells far more valuable than they otherwise can become, by sinking shafts at a little

distance from the present springs, with a view of procuring a purer supply of salt water, for the purposes of manufacture, and would also work the lime stone in conjunction with the salt, but without this aid, situated as these productions are, in the midst of an uninhabited forest, and not within 8 miles of any population, I fear there is not inducement, sufficient to render it worth his while attempting it, or incurring the expense which must necessarily attend such an undertaking.

I may here observe that these forests abound with the finest *Nahor Trees* I have ever seen, a wood, which, though from its weight and extreme hardness, is perhaps not adapted for all purposes, is most admirably so for beams, posts, &c. where great strength and durability is required, and might be very advantageously used in all Government buildings where obtainable.

I left Bar Pathor after seeing all my supplies well off in boats on the 23th ultimo, reaching the mouth of the Duopani Nuddi on that day, the Harrioghan Mookh on the 29th, the Debopani Mookh on the 30th, and arriving here on the afternoon of the 31st, the road running along the line of the Dhunsiri, though straightened in many of the turnings for 33 miles through the densest forests, the last 10 miles being up the bed of the Dhunsiri itself.

Through all the desolate jungles that I have hitherto travelled, and they are not a few, I never met with one so completely abandoned by life as this; no animal of any kind was seen, nor was a bird heard from morning till night, the death-like silence being only broken by the heavy fall of the *Otengah* fruit, these trees composing the entire forest or nearly so. The marks of the river left on the trees was every where visible from 1 to 9 feet in height, forbidding all idea of making this line, that of communication with this post, save during the cold season, and that too at a late period from the number of impassable swamps, which everywhere intervene, and render all attempts at rendering the present path any shorter, or much more practicable than it is, alike unavailing.

Fodder for cattle, especially elephants, is remarkably scarce, my men finding the greatest difficulty in obtaining the smallest supply, and that too of a very poor description.

The vast number of trees, which are sunk in the river and on the sands, render the navigation for boats almost impossible, beyond the Daopani, unless perhaps during the rains, and even then, it is not without the greatest care, that boats can proceed, either up, or still more so, down the river; a very large one last year was swamped close to Bor Pathor, while passing down empty, being entangled in a large tree, one of

the men being drowned, and the rest with difficulty saved, the boat being lost.

Such being the state of the country on the North side, it will be necessary to open a better communication, than at present exists towards Mohong Dezoah, and for that purpose, I intend engaging a large number of coolies, if possible, from Tuli Ram Senaputti's country, to construct a regular road from Mohong Dezoah to this part, unless a better site can be shortly discovered, clearing away the jungle, and if he will agree to it, locating 10 or 15 families of Meekirs, at this place who shall be kept up for the purpose of clearing the roads, &c. for the future.

Should he agree, I shall further propose, that the revenue of these persons shall be for the present defrayed by government, either by a direct payment to the ryotts themselves, of the amount demandable from them by the Senaputti, or in case of their objecting, a trifle more, or by crediting him that amount from the annual tribute paid by him to government in ivory.

Should I be able during my present expedition to reduce the Nagah chiefs to any state of order, it would be desirable further, to try and settle a few of these men in the neighbourhood, on the East bank of the Dhunsiri, allowing them to occupy any lands they choose, exempt entirely from all rent or taxation, until such time as matters shall be so changed, as to seem to call for fresh arrangements; as however this is mere speculation, I shall pursue it no further at present.

While at Bar Pathor I was visited, on invitation, by the Phokun or chief of the Rengmah tribe of Nagas before mentioned, who complained of the loss he had sustained, together with his tribe, by the abolition of the former establishment of *Kutkees*, or, I might call them, supercargoes, who were formerly the medium of communication between this race and the merchants, in all their dealings, through whom all orders, and communications to the Nagas passed, begging their restoration, together with the small quantity of lands, &c. which these persons enjoyed as a remuneration for their services.

From the short conversation I had with the Phokun, he was anxious not to stay, on account of some religious festival which commenced 2 days afterwards; he stated that the lands and pykes were bestowed on his grandfather and father, for services done in the time of the insurrection of the Muttacks or Moamarriah tribe, in preserving the property, &c. of the then Bor Gohain of Assam; that he had applied to Mr. Scott, on the subject, at Gowhattee in person, and had received assurance that his claims should be considered as good, but that now the whole lands have been

taxed, the *kutkees* abolished, and that his authority and rank have fallen so low, that scarcely his own tribe acknowledge him.

I regret that I am not acquainted with the reasons, on which the arrangements now in force were adopted, sufficiently, to enable me to enter into a full detail of the case, but you may be able from what I have stated, to refer to the documents, I have now with me, and form an opinion, whether on payment of a small tribute in ivory, which they are, I was informed ready, and willing to pay, the remission to the extent required might not safely be effected.

The Phokun further expressed a desire to be taken under protection from the attacks of the Lotah tribe of Nagas, with whom there has been an enmity existing for a long time, and he asserts, though I fear without any direct proof (he promised to produce witnesses before me at this place to depose to the fact), of the village called Beloo, not far from Mohong Dezo-oah, having been attacked by a party of Lotahs from the village of Tagdie, last year, and one man and a child murdered. On this subject I shall again address you when the evidence shall have been adduced, but may observe that the trade of the Lotah Nagas being completely in the power of the Principal Assistant Commissioner of Seebpore, some injunctions might be conveyed to the Naga Hazarri of that tribe holding him responsible for any repetition of such acts.

Looking at the map of this country, you may observe that the inclination of the lime formation of the Nambur Nuddie will exactly, or within a trifle, correct the points at which it has also been found at the Falls of the Jumoonah, near Mohong Dezo-oah at Langolar, spelt 'Lowrung' in Captain Pemberton's Map on the Kopili, and so on towards Sylhet, not improbably forming one long line of similar formation throughout.

Note on the Brahooses.—By CAPT. HART, Bombay Army.

These tribes are the descendants of 'Braho,' a Bulooche, who emigrated, about the second century of the Hejira from Aleppo to Mukran : some years after his countrymen had settled there, he fixed his abode at Koliva, a few days journey to the westward of Kelot which city was then inhabited by the Tajuks, over whom ruled a Hakim from Herat, the seat of sovereignty. These Tajuks were a turbulent and overbearing race, noted for their hatred to the yoke of Herat. Several of their Hakims had been slain in popular commotions, and at length the part was considered of such danger, that a newly appointed governor

exacted an oath from the heads of the tribe, that they would not destroy him by the sword or poison, before he ventured to enter the city. On the strength of his fancied security, he harassed the people by his exactions, and his death was in consequence decided on. To adhere to the letter of their bond while the spirit was evaded, five hundred of the Tajuks baked cakes of bread, in which they mixed up stones and cotton with the dough. These they concealed under their garments, and attended the Hakim's Durbar. A dispute soon arose between him and one of the landholders, and the passions of the assembly being excited, they stood up of one accord, and slew him by blows with the cakes. They then determined on choosing a Governor for themselves, and 'Braho,' whose countless flocks and herds entitled him to consideration in the country, was solicited to take up his residence in Kelat as their Lord and Master, he declined complying with their request, on the plea of preferring a life in the wilds to the confinement of a city, but offered his youngest son 'Kumbur' to their notice, as one for whom he had not made any provision, and who was therefore free from those ties which bound his brethren to their homes. After much urging, 'Kumbur' consented to become their Chief, the Tajuks stipulating to furnish him with eighty horse as a body guard, to build a house, and supply him with every necessary of life. After a few years, 'Kumbur' forced the several tribes of Moguls and Baloochees in the neighbourhood of Kelat to acknowledge his supremacy, and in process of time the whole of Mukran and Northern Kunchee was ruled over by his descendants.

'Braho' had seven sons :

- | | |
|-----------|----------------------------------------|
| 1 Meerun, | from whom are descended the Meeranees. |
| 2 Simael | " " Simalanees. |
| 3 Roden | " " Rodenees. |
| 4 Peerak | " " Peerkanees. |
| 5 Yug | " " Yugur Menguls. |
| 6 Khadr | " " Khidranees. |
| 7 Kumbur | " " Kumburanees. |

These are the real Brahooe tribes, but many others subject to them, are now included in that appellation.

They are,

Tribe.	Subdivision.	Begin.	Place of abode.	Estimated No. of families.	Present Chief.	Remarks.
Saraban	Reisance	Mogul	Kuhnuk ..	300	Asud Khan.	The Sarabans, or those of 'the right hand' held Inams and Jagheers from the Kelat Khans on whose authority they considered themselves dependent.
	Shahwane ..	Bulooche ..	Moostoong ..	1,000	{ Mahomed Khan.	
	Surpurra	Mogul	Kurdugan ..	12,000	Synd Khan.	
	Bungoolzye ..	Syuds	Tepulinjee ..	2,000	SherMahamed	
	Mahomed Shahce ..	{ Mogul	Moostoong ..	1,000	Deenar.	
	Koord	{ Ditto	{ Dsht-i- } be Dowlut }	400	Loll Buksh.	
	Lahree	{ Rind Bu- looche .. }	Nagao			
	Rind	Bulooche ..	Makron	12,000	{ Loll Buksh. Bulooche Khan. Meer Say Mahomed. Meer Baker.	
Jhalaban ..	Zahree	Mogul	Gatt	3,000	PraheemKhan	The Jhalabans, or those of 'the left hand' were Zumeendars who yielded by slight obedience to their ruler, their lands being hereditary.
	Mengul	Bind	Nall	2,000		They respectively occupied seats on the right and left in the Durbar.
	Mahomed Hoosainee }	Mogul	Kohpoosht.	30,000		
	Beegunjaw }	Prind	Wud	500	Kuhrer.	
	Zugur Men- gul	Brahooce ..	Nooshky ..	1,000	Ahmud Khan.	
	Mughee	Bulooche {	Jull and in } Mukran. }	12,000	Ahmud Khan.	

A three weeks sail in search of Health—Province of Arracan—Kyok Phyoo. —Its Harbour, Productions, Capabilities, Geological features, Visit to an active volcano. By HENRY HARPUR SPRY, M.D., F.G.S., &c., Secretary to the Agricultural and Horticultural Society of India.

Circumstances rendering it necessary that I should have recourse to a little relaxation, in consequence of a severe attack of illness, I determined to take advantage of the sailing of the H.C.S. Amherst, to the coast of Arracan, on the 19th of last month (Feb. 1841) to secure a passage in her and visit the port of Kyok Phyoo, at Ramree. The ship left Calcutta, in tow of the Ganges, Government Steamer, and reached the Sand Heads at the close of the third day. Thence we proceeded under sail, and at the expiration of four days, dropt anchor in the picturesque, and most spacious harbour of Kyok Phyoo. We were there in exactly a week from Calcutta. The cruize from the Sand Heads across to the coast of Arracan, was a most delightful one. The wind was gentle, and the sea so smooth, that out of a party of 400 sepoys and camp followers who were on board, only two that I am aware of, underwent the miseries usually attendant on a sea voyage when undertaken for the first time.

On the morning early, of the day preceding the one on which we arrived, land was visible, and the entire day was spent in coasting along the

mountainous, rugged, but thickly wooded islands, called the Bolongas or broken islands. As night closed in, the anchor was dropt about a league outside the harbour of Kyok Phyoo.

There are two or three 'dangers' in the passage way, and it becomes therefore desirable, that day-light should exist while steering through the harbour. On one occasion, however, the Captain of the *Amherst* stood in on a bright moon-light night and took up his right position without the occurrence of any accident. With the exception of the rocks here alluded to, the entrance of the harbour is deep and spacious.

I confess, as we sailed in, early the next morning, the general appearance of the harbour and scenery surrounding it, created a most favorable impression. The first object which attracted my attention was the Saddle Island. It stands on the south side of the entrance of the outer harbour, (there are, as it were, two harbours) is about three quarters of a mile, or a mile in circumference, and has a peak of about 120 or 150 feet in height. On it, a neat bungalow has been built by the present Marine Assistant, Captain Brown. Here it has become the fashion of late, for parties of pleasure to resort, to pass the day in the agreeable occupation of shell picking, coral gathering, bathing, ship sighting, or if it suits them better, drawing, reading, or geologizing, while the health inspiring breeze of the sea is blowing on their frames.

As the ship sails along, new and striking peculiarities claim the observer's attention, and some of the earliest of these, are, the cantonment bungalows of the officers which stud the beach at irregular intervals, for a distance of three miles as far as 'Sandy Point;' this forms the northern promontory of the inner harbour, and on it stands a two 12-pound battery, with an appropriate flag staff, under the designation of 'Fort Dalhousie.' On the land a little elevated above the sea shore, and about a hundred yards from the pebbly and sandy beach, with nothing to impede the current of the refreshing sea breeze as it comes off the ocean, are seen those cottages on piles, known as bungalows, overhung and shaded by the lofty *Dipterocarp*i; the bank on which they stand is of yellow sand, and along the beach at sunset, or in the morning, the valetudinarian may gallop without intermission on the active sure footed pony of the province for three good miles, and court the healthful breeze. A small thatched bathing house stands conspicuous. It is the resort, every morning, of the lovers of bathing, who delight to wrestle with the waves and luxuriate in the sea.

Kyok Phyoo has not reached that pitch of celebrity yet, as to call for the erection of bathing machines, but no beach in the world is

better adapted for them, if the taste of the public should ever turn that way.

The groups of large islands, covered with deep rich foliage, which form the harbour of Kyok Phyoo, rise abruptly from the sea, and afford water beside them so deep that ships can sail in safety. The hills are clothed to the top in dense and luxuriant vegetation, while the peaks of some run up to heights that are computed to extend to 7 or 800 feet.

The harbour of Kyok Phyoo, as I have before remarked, is extremely picturesque, and in its conformation and capabilities, reminds me forcibly of the one at Trincomalee—Like the latter, it is divided into what may be termed an outer and an inner harbour. The outer one being more of a roadsted than the inner, which is sheltered by the point of land on which the flag staff stands, and is safe for ships in all weathers. The harbour and roadsted, with the contiguous extensive deep bay, known as Fletcher Hayes' Straits, which stretches away amidst a series of many beautifully grouped islands between the eastern side of Ramree and the main, constitute an anchorage that I am assured would afford safe shelter for the shipping of the whole world.

With all these new and engaging features before me, it was with no ordinary feelings of delight that I stepped on shore to investigate and examine for myself. I found that a great and most beneficial change had been wrought of late in the physical condition and aspect of the station of Kyok Phyoo. The dense *low* jungle which formerly choked the cantonment grounds, had, through the active exertions of the local authorities, been effectually removed, as had the brush-wood and most of the timber trees which grew on a contiguous low belt of sandstone hillocks, which formed the south western boundary of the station. Drains for the outlet of accumulated water had also been cut, and temporary bridges erected. The last it may be expected will shortly be superseded by more becoming brick ones, as the materials, I was informed, had long been lying accumulated on the ground.

The salubrity of the place has by these measures been much improved, and the first intimation almost which I received on landing, was the gratifying assurance, that during the whole period of service (two years) that the regiment then on the island on duty had passed, not one death had occurred among the officers, or, (I believe I am correct in this) any one of them been obliged to leave it from sickness. One great and powerful complaint still exists against Kyok Phyoo as a regimental station. The Hindoostanee soldiers suffer dreadfully from

sickness. I was curious to learn, if possible, the cause of this, and the explanations which were offered me, in a great measure satisfactorily account, I think, for so unfortunate and much to be regretted an occurrence. The Arracanese or Mugs, as they are usually called, *invariably* (there is no exception to the practice that I could learn) build their dwellings on piles, so that the floor of the room is not only elevated a distance of two or more feet above the surface of the ground, but a *current of air* passes freely underneath it. At the jail, which is a series of spacious well continued erections, the system of the country has been followed, and the prisoners are housed in a number of large dwellings within a strong stockade. It is left for regimental sepoys to be experimented on, to test the value of Mug wisdom, by doing without piles and hutting the unfortunates in the manner now in use. To the men instead of being hutted as the people of the province are, and indeed *as the transported felons are*, (for Arracan is a penal settlement and Kyok Phyoo has a party of above three hundred convicts stationed at it,) are compelled to live in low or unraised huts, which are built in a series of lines forming streets, and in such a damp locality, that I (although it was then far advanced in the month of February) sprung a couple of snipe out of the grass, within a yard of these abodes.

After strong, and I believe repeated representation, not only on the part of the duly constituted medical authorities, whose business it is to watch over such duties, but by the chief Military authority also, I am told that the Military Board sanctioned the formation of raised boardings or *matchauns within the huts*, so as to enable the sepoys to sleep off the ground. But this is not enough. Whatever dampness or exhalation is emitted from the soil (and that *something* noxious does transude the practice of building, which the genius of the people has suggested, proves) is still pent up by the mat walls which reach the ground and exclude the free circulation of air underneath, an observance which, as I have just remarked, is deemed essential to the preservation of health. Common humanity dictates the measure, and a State characterized for its considerate attention to its army, ought without hesitation to hasten to remove a grievance so fully calculated to produce the suffering and disastrous consequences which are now experienced.

There is another and I think not sufficiently regarded cause operative of the suffering which the sepoys undergo from sickness, a portion of the men, in the Volunteer regiments are Mahomedans. They are proverbial for their careless extravagance. 'A Mahomedan (said Ameer-ul-omrah the second son, and for some time minister of Mahommed Ali the

former Nabab of the Carnatic) was like a seive—much of what was poured in went through; while a Hindoo was like a sponge which retained all, but on pressure gave back, as required, what it had absorbed.' And so at Kyok Phyoo. The Mahomedan sepoys to gratify their habits of debauchery, borrow from their more thrifty Hindoo brethren who *stint themselves of the common necessities of life* to gratify their saving propensities, and rather than purchase good sound, but expensive food pinch themselves with half meals of the worst description. The Hindoo sepoys of the 65th regiment brought away with them, I was assured by the officers, on their return to Calcutta upwards of 40,000 rupees which they had saved during their two years and half tour in the Province.

Leaving this painful subject for others of a more pleasing kind, I hasten to complete my observations regarding the site of the Cantonment of Kyok Phyoo. The soil is almost entirely sand, but yet much vegetation till recently abounded and even now the many lofty Dipterocarpi speak plainly of the adaptability of the ground to produce rich and luxuriant growths. These Dipterocarpi early attracted my attention. They are the trees, whence that (to the London market at least) novel article of commerce, known as the Gurjun or wood oil, is obtained. On examining into the process by which this most valuable product is obtained, I found that the practice was to cut a large notch something of the form of a rude arch into one side of the tree near its root, a depth of three or four inches, with the base sunk from the external edge inwardly to make it cup-like, so as to hold the oil. A fire is then kindled in the aperture for a few minutes, by which means, it appears, the sap vessels are stimulated, and the oil once set an oozing flows gradually down, drop by drop, till the cup-like hollow at the bottom of the notch becomes filled, when it is dished up, and set aside for use; successive supplies are for a long time in this manner obtained.

An abundance of these trees are to be seen in every direction about Kyok Phyoo, and I am told are equally plentiful on the island of Cheduba and elsewhere throughout the line of coast. While on the subject of these trees I cannot omit mentioning a circumstance connected with the produce from them, which although of somewhat a private nature, is yet of sufficient peculiarity to merit recital. More than two years ago, when in correspondence with Dr. Royle, I procured eight large casks full of the wood oil and shipped it for London to be sold in the London market and its value fairly tested. I knew that the Portuguese in the days of their early career in India had all dealt largely in the article, for Bolt in his 'Considerations of India,' particularly alludes

to it. I knew moreover that for time out of mind the people of the Province of Arracan and of Burmah in general, had used it for all sorts of work; that moreover Roxburgh alludes to it, and that in fact it was an article well known in India. What was my surprise at finding from Dr. Royle that so ignorant were, and still are, the authorities at the London Custom House of the nature of this substance, that they positively deny that it is a raw material, and will consequently only admit it as a '*Manufactured article*', which entails the payment of a duty that the oil itself would never sell for. In his recently published work on the productive resources of India, Dr. Royle has pointedly alluded to this lamentable ignorance on the part of the London Custom House authorities of some of the products of India.

To return to remarks on the station. The bazar is clean and well arranged. Beside the various roads young timber trees have been planted. These are not in the most flourishing condition. It may surprise some to be told that after so recently denuding the soil of the jungle, that trees should again be planted, but arborescent avenues would be a great ornament, serve to keep down temperature, and not to promote sickness. Many of those now planted are dead and it will be many years before any will assume a commanding appearance.

The people are decidedly superior in physical conformation to the Bengallees. They are an athletic and intelligent race. Their agricultural and mechanical appliances show it, and in their dealings with the Europeans they evince an independence of character that surprises a person accustomed to the manners of the obsequious Asiatic.

The harbour abounds with fish, and I was particularly struck at the ease and facility with which a daily supply was obtained for breakfast. Half an hour before the usual time for eating the meal the word was passed for '*Mutchee mar.*' At which command the boatmen took the net and proceeding to the beach threw in the lines, and in ten minutes three or four fine mullet were presented to the cook.

Besides these mullet, the pomfret are noted for their high flavour, and the oysters are of an excellent kind. At certain seasons, at the close of the rainy months, innumerable boats go off to Combermere Bay, an extensive but somewhat shallow roadsted, contiguous to Kyok Phyoo harbour, and here fish for the polynemous, the sounds of which they cure in large quantities, and sell to the China junks which annually pay a visit to the coast for the purpose of trading for these and other articles. It is the opinion of a gentleman, who has had opportunities of making abundant enquiries, that the fishing for isinglass might be conducted to a great extent.

Only the day before I arrived, a Chinaman, (the only one indeed who lives at Kyok Phyoo) who acts as agent for his countrymen who trade on the coast, bought up five maunds (400 lbs) of these fish sounds for about 25 rupees a maund.

A small rock, known as the Pagoda Rock, at the mouth of the harbour, furnishes the edible birds' nests in small quantities, and the government derives an income from it as well as from wood oil, wax and honey. In the year 1835-36, the collections of revenue on account of the edible birds' nest found at the island of Ramaee stood at 106 rupees and that for the whole Province at 4160 rupees in the Government books, while the collections on account of form of wood oil was 17 rupees—eath oil 162 rupees—bees wax and honey 660 rupees. The nests the China junks carry off. Such are the chief productions of the harbour. Many other fish of course abound, but the pomfret, the mullet, the becktee, and the oyster stand foremost.

I must now allude to another subject, and that is one of considerable importance. I allude to the manufacture of salt. The water of the harbour at Kyok Phyoo contains a much larger quantity of saline matter than that in the Sunderbunds. On comparison it will be seen, I believe, that the one holds near 20 per cent more saline matter in solution than the other. The government has already taken advantage of this circumstance, and has caused Golahs to be erected, whereat they store salt, which the people of the Province are but too happy to supply at 4 annas a maund. The manufacture is solely by solar evaporation, and the preparation is of the finest quality. Such opportunities must demand greater attention, and a few years more will probably see this superior article, superseding, almost to utter extinction, the dirty earthy article which is now obtained from the Sunderbunds.*

One of my earliest enquiries, after landing at the picturesque station of Kyok Phyoo, was, to enquire into the progress made in the recent coal discovery.† I found that the principal locality here alluded to, was not on the island of Ramree itself, but on a rock off the island about a mile, know by the name of 'the Cap Island,' but that minute traces of it had been found at a point of the main island which is nearest in contiguity

* My friend and correspondent alludes to the Salt as sold in the bazaar: it is perfectly white, and pure when first made, but the process of removal, and weighing dirties it in some degree and the adulteration by the retail dealer brings on the earthy look he alludes to: 7, not 4, As. is the price given.—H. T.

† I beg here to state that what is here stated regarding the coal localities at Kyok Phyoo was reported by me to the Secretary of the coal Committee and has since appeared in Dr. McClelland's Journal.

to this rock. The specimens, which I brought away will afford good average pieces of coal and its immediate connected formations. I took an early opportunity of availing myself of the kind offer of Mr. Brown, the Marine Assistant to the Commissioner of the province, and Col. Hervey, to whose exertions this interesting discovery I believe belongs, to visit the Cap Island and examine the formation. I found it partaking, as might be expected, when the general character of the line of coast is taken into consideration, of all the characters which denote active volcanic agency.—The rock itself is in great part made up of sand-stone, but so distorted are the strata by the upheaving force, that in places they appear at an acute angle, and even vertical, while they are so appositely placed as to convey the idea, that at this point some confined force had here found an outlet, and split the incumbent bed. The rock runs up to a peak.

On one face of the rock a thick deposit of marly earth is seen, and on it an abundance of vegetation thrives. At the seaward point of the rock, and barely above high water mark, the coal is found. The sand-stone strata here, though not so highly distorted as in the more central part, is still at an acute angle. It is intersected by a bed of fatty marl of about a foot in thickness, and amidst its substance, and sometimes in a shaly deposit, the lumps of coal are found. I say lumps for as yet no continuous seam of coal has been discovered, but all is yet in its infancy, for, besides scratching the surface soil for a few inches, nothing has been done to test the extent of the formation.

I confess, when I look at the position of the place, I see no immediate prospect of a supply of coals; and taking the difficulties of keeping out the water into consideration, (even supposing that a continuous seam was found) with the great dip of the strata, nothing but an outlay for machinery could fairly test it.

Leaving the Cap island, the next locality that I visited, was the point of land on the island of Ramree, most contiguous to the Cap island. From the direction of the outcropping coal strata at the Cap island, it was inferred that similar indications might be found at the point of land now adverted to, and a close search being made, a formation identical with that at the Cap island was found with thin traces of coal. The dip here is equally great with that at the Cap island, and would require a shaft to be sunk, through the intervening sandstone stratum, to enable the searcher to ascertain if a bed of coal of any consistence did exist. When I came away Captain Lumsden, the Principal Assistant, was sinking two pits at a part of the island, some little way, perhaps half a

mile, from the spot where the indications of coal were observed, and the laborers had got perhaps ten feet;* but no effectual effort is likely to be made, nor indeed, is it possible under existing circumstances, for it appears that no expense is permitted to be incurred, while of machinery—not even a whim for raising the rubbish or water is erected.

Every disposition exists on the part of those in authority at Kyok Phyoo, to carry out the investigation, but they say, and say justly, that they have no funds placed at their disposal for doing so, and, out of their own pocket, it is too much to expect that they should defray the charges. The consequence is, the poor laborers are left to go unpaid, and great dissatisfaction is felt accordingly.

To leave this subject. After visiting the localities now mentioned, a proposal was made to sail across the harbour to the eastern point of the island, and proceed to the summit of a lofty hill which stood about three mile inland, and on which is the cone of an active volcano. The suggestion was immediately acceded to, and at four o'clock in the afternoon our party began to ascend the rugged path which conducted to this interesting object. I had heard that two or three other Europeans had already visited the crater, and that at the close of last year it was emitting smoke and ashes. Our companions were several boatmen, and each man, more from habit than singularity, carried, the never failing accompaniment of a mug a *dhow*, which is a large powerful knife in shape about the size of a regulation sword broken of in the middle.

After various humorous adventures, in the midst of the dense jungle, and traversing the crater of a small dried up volcano, we succeeded in reaching the anxiously sought hill, and when we reached the top, most amply rewarded we were. Never did I behold a more delightful piece of scenery. The view commanded the whole of the northern portion of the island, and that extensively sheltered anchoring ground, before alluded to, under the name of Fletcher Hayes' Straits.

But to the immediate objects of our visit. The cone was beautifully formed of the erupted mud, and covered to the very brink of the centre with thick verdant grass. Out of it grew luxuriant *Casuarina* trees. And here I cannot avoid mentioning a very remarkable circumstance connected with the appearance of these trees. Nowhere, as far as I could learn, do they appear, except on the cones of the volcanos, of which there are several, to be found on the island of Ramree. More than once when hid

* I have since heard from Captain Lumsden that the work has been abandoned as hopeless.

amidst the dense foliage of the forest, and at a loss in what direction to turn, we sought an open space and searched for the Casuarina trees, and in this manner were attracted to the desired spot. On the edge of the crater and about the sides of the cone amidst the grass, I picked up shells, (helix ?) pieces of indurated clay, quartz, and clay intersected with spar. They all go to show the character of the disrupted material. The edge of the crater was most uniform, and its diameter was about twelve feet. Its interior was filled with warm liquid mud, and on plunging down a rod, it passed on for about eight feet, and then struck in a thick plastic substance. After examining it in all directions, and satisfying our curiosity to the utmost, we hastened to return, and at length succeeded in reaching the boats, highly gratified and delighted at the success of our adventure, and the interesting novelty which it had unfolded to us.

I left Kyok Phyou much pleased with the peculiar and many various features which it presents, and returned to Calcutta after an absence of three weeks, much improved in health by the excursion.

Description of some Ancient Gems and Seals from Bactria, the Punjab and India.

1. GRECIAN.

Whether it is, that the collection and study of ancient gems and seals, is less interesting in itself than the study of coins, or that it leads to less immediate and satisfactory results, I am unable to say; but perhaps both of these reasons may have combined to render the one less attractive than the other. But whether from one or from both of these causes the effect has been the almost total neglect of this study in India; although the specimens scattered amongst the numerous individual collections must now be valuable, as well as easily accessible. Some of these I have collected together in the accompanying plate, in the hope that others may be induced to make public what they may have stored up in their cabinets.

The earliest notice of an ancient gem procured in India, of which I am aware, is in Vincent's *Ancient Commerce*, vol. 2, p. 760, where he makes mention of 'an emerald belonging to the Archbishop of York, engraved with a Medusa's head, of Grecian sculpture, and brought from Benares.' And in the *Trans. of the Royal Asiatic Society* vol. 3, page 139, there is an engraving of 'an ancient Hindu intaglio,' with a long rambling description, by Colonel Tod. The gem itself is a beautiful one, representing Hercules

naked, his head diademed, leaning his left hand on his club, and holding out in his right hand a little figure of victory, which is extending a wreath towards the hero; to the right are two Sanscrit letters, one above the other, in the same position, and apparently of the same age, as those we see on the coins of the Guptas, forming the word *Aja*; which is probably only a monogrammatic contraction for *Ajaya*, the invincible, a very appropriate epithet for the ever victorious Hercules.

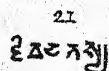
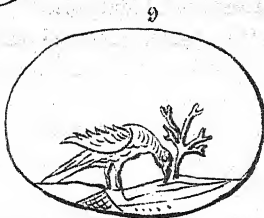
I have no doubt that many other notices of ancient gems procured in India may be found with a little search; but I have neither the time to look for them, nor the ability to elucidate them, should my search be successful; and I therefore trust that the brief remarks, which I am about to make, may be received with indulgence.

No. 1. Brown translucent agate, procured at Benares. Bare and bearded head of Hercules to the left, his hair short and curling; his great strength shown by his short brawny neck; and his club placed behind his head. This seal is of beautiful workmanship, and in exceedingly bold relief and the engraved parts are highly polished.

No. 2. In Colonel Stacy's collection, purchased, I believe, at Delhi. It represents Omphale standing, inclined to the left, and bearing the club and lion's skin belonging to Hercules; she having given him her distaff and bright colored robe in exchange for them. The engraving of this gem is well-done, but it is not in my opinion at all equal to the other—and yet her air of fancied strength assumed with the spoils of the Nemean lion, and the hero's club, is capital; and the making her grasp the club with both hands, displays at once both the woman's weakness, and the nice observation of the artist.

As these gems represent mythological persons of ancient Greece, they must have been brought into India from the North West, and as many gems are yearly discovered in ancient Bactria, I have little doubt that these, and indeed all gems purchased in India which bear Grecian subjects, must have come originally from ancient Bactria, the seat of the nearest Grecian colony, and where we know, from the beauty of the earlier Bactrian coins, that the arts must have flourished in the greatest perfection.

If these gems then owe their origin to Bactria, it is not improbable that the two just described may have been engraved during the long and prosperous reign of Euthedymus, all of whose gold and silver coins, yet discovered, bear the figure of Hercules; for it is but natural to suppose, that a Prince, who for so long a time exhibited this deified hero upon his coins, would likewise have had the head, the figure, and even the history of the



same personage engraved upon his seals.* Such at least is my opinion, which is greatly strengthened by the beauty and depth of the engraving, and by the peculiar mode of representing the short curly hair, which is the very same style that we see upon the tetradrachms of Euthydemus.

No. 3. A red cornelian, much worn and slightly fractured below, having a bare youthful head to the left, with a scarcely perceptible beard and long curling hair, with the chlamys fastened upon his shoulder. The execution of this seal is very beautiful; and the relief is bold, deep and highly polished. It was procured at Lucknow, but I am not sure that it may not owe its origin to modern Europe; the antique chlamys, however, gives it a delightful claim to be considered ancient, which the beauty of its workmanship makes me unwilling to dispute.

No. 4. A small red cornelian, purchased at Amritsir. Its execution is very inferior, and shows that it must belong to a declining period of the arts in Bactria. It represents Mercury half turned to the left, with his chlamys or short cloak over his shoulders, his caduceus in his left hand, and an undecided object in his right hand.

No. 5. A Súlímáni, or light brown translucent agate, having a middle layer of milkwhite chalcedony, from Benares. It is of excellent make, but is very much worn, only a few strokes of a long inscription being now visible. On it are represented two standing figures, male and female. The female to the left is clothed to the feet, her head is surmounted by a basket, and encircled by a halo—she holds in her left hand a cornucopia, and in her right a torch, under which is an undecided object, resembling a bird. To the right the male figure is clothed to the knees,—his head dress is surmounted by a pair of wings, and his head encircled by a halo: he holds a trident in his left hand, and his right hand is raised towards the cornucopia held by the female figure. Between the two figures is a pitcher, and over them an indistinct object.

The two figures on this gem are, I believe, from their peculiar emblems and attributes, Osiris and Isis, or the Sun and Moon, as deified by the Egyptians. Though the worship of these divinities was popular enough in later Rome, yet I think it was never so amongst the Greeks, and more especially not amongst the distant Greeks of Bactria; wherefore I am

* Since writing the above, I have received from Capt. Hay, impressions of two copper coins of Demetrius, both of which have the head of Hercules bare and bearded as on this seal, and with the club behind the head. I am therefore inclined to believe that the bare and bearded head on the copper coins of Euthydemus is that of Hercules. The discovery of these coins of Demetrius bearing precisely the same type as the seal, in my opinion almost confirms the correctness of what I have advanced as to the period when this may have been executed.

led to suppose that this stone may have been engraved in Egypt during the fostering and happy government of the earlier Ptolemies.

No. 6. A red cornelian, of barbarous execution. Two standing figures, male and female, with a cross between them, the male figure holding up a wreath in his left hand. Though this is probably the work of modern days imitated from an antique, yet many seals of equally barbarous workmanship are yearly found in ancient Bactria, all of which most probably belong to the latest period of the Grecian dominion in that country.

No. 7. A white cornelian of milky hue, very thick and round, having a hole pierced from the top to the bottom. It represents a male figure standing to the front, his face turned to the right, he is clad in the Indian *dhoti*, and wears the sacred thread across his breast; flames spring from the top of his head, which is encircled by a halo. In his right hand he holds a trident, and in his left hand, which is placed on his hip, he carries a *lota*, or drinking vessel; and a loose robe, or *chadr* hangs over his left arm. Legend to the left in Bactrian Pali characters 𑀧𑀸𑀓𑀺𑀢𑀺 which is probably some compound of *jas* (Sanskrit यशस्) fame; such as

Jasvatisa (for यशस्वती) 'of the renowned.'

This beautiful gem came from Cabool: the execution is good, and the design graceful; the position of the body is easy and unrestrained; the limbs are free, and the outline of the figure and the folds of the drapery are naturally and simply expressed. The figure is the same as that we find on the coins of the Indo-Scythian Kadphises, excepting that the face is turned in a contrary direction. The Indian *dhoti*, and the sacred *poita* of the superior castes are so distinct on this gem, that I cannot hesitate in ascribing its origin to India, and in assigning it to the period when the Indo-Scythian Kadphises reigned over the Punjab and Cabool. In execution this seal is decidedly equal, if not superior, to the finest gold coins of Kadphises, and I cannot therefore be far wrong in attributing its age to the reign of that Prince, who must have flourished before Kanerka; for the money of the latter became the type of several series of the Indian coins down to so late a period as the Mahomedan invasion: while the coins of Kadphises were not imitated except by his immediate successors, who may have issued the barbarous gold coins with a man and bull on the reverse, (see Figs. 45, pl. 33, vol. 4, J. A. S. of Bengal.)

On a few gold specimens, and on all the copper coins of Kadphises, the figure which we see on this gem, is represented standing before a bull, and not alone, as on the commoner gold coins of that Prince; and this is also the way in which the Deity is placed on the gold and copper coins of the

unknown prince, noticed above as being one of the successors of Kadphises. On those coins we invariably find the legend OCPO. which is no doubt the name of the figure; and consequently we may pretty safely take this word OCPO to be the equivalent of the Bactrian Pali legend of the gem. Now Professor Lassen has happily explained *Okro*, by *Ugra*, a name of Siva, of whom indeed the trident and the sacred bull *Nundi*, are peculiar and unmistakeable attributes: and hence it follows that the figure on the seal must be that of the God Siva.

No. 8. A Cameo, in the collection of Sir Alex. Barnes, of most admirable workmanship, in bold and beautiful relief. It represents a half length of Silenus to the right; his head bald and bearded, and bound with a wreath of vine leaves; with a flat nose, sparkling eye, and laughing, all betokening the merry companion of Bacchus. He is holding up his left hand before his face with the fore-finger, and little finger raised, and in his right hand he is carrying his drinking can in a sloping direction. A thyrsus is placed behind him, and his robe is thrown over his right arm.

In this exquisite little gem Silenus appears, cup in hand, telling some humorous story, replete with the wine-inspired wit, broad fun, and shrewd pithy remarks for which he was celebrated: the sly expression of his face is excellent; and his jolly corpulent figure reminds us at once of 'laughter holding both his sides;' while the sloping way in which he holds his cup shows either that it is empty, or that he is so tipsy, and so taken up with his story, which he is impressing with the action of his left hand more earnestly upon his hearers, as not to know that he is losing his wine; or we may suppose that, having drained the cup, he is exclaiming 'Papaiapœx!—what a sweet taste it has!'

The exceeding beauty of this exquisite little Cameo of the Grecian Falstaff, proves that it must have been engraved at a time when the arts in Bactria were in the very highest perfection; and consequently during the earliest period of the Bactrian power: and I think it highly probable that this gem may have been executed during the reign of Agathocles, whose coins usually exhibit devices belonging to the worship of Bacchus; and no doubt upon his seals and gems there were represented stories and figures emblematic of the same worship.

The coins of Agathocles, are, in my opinion, the most beautiful of the Bactrian series as works of art, and therefore I am inclined to place him before Euthydemus and Demetrius in the list of Bactrian Princes; and to assign him the country of the Parapamisades as his kingdom, Nysa or Dionysopolis for his capital, in which 'City of Dionysus' I suppose

that this beautiful Cameo of Silenus was engraved, at the same time that the Bacchic coins of Agathocles were united ; that is about 240 B.C.

No. 9. A red cornelian, in the collection of Sir Alex. Burnes. It is of coarse execution, although its design is good ; and is probably only a copy of a better gem.

No. 10. Likewise in the collection of Sir Alex. Burnes ; this seal is of very inferior execution ; the subject is similar to that of the coins of the Grecian colony of Falisci in Italy.

2. SASSANIAN.

No. 11. A red cornelian, from Amritsir, very thick, and with a hole near the top for suspension ; the two streamers to the right are just the same as those that we see upon the Sassanian coins.

Nos. 12 and 13. These were sent to Mr. Prinsep by a gentleman residing in Persia ; on No. 13 there is a Pehlvi inscription, but I am not able to offer any thing myself regarding its interpretation.

No. 14. In the possession of Colonel Stacy.

3. HINDU.

In the Journal of the Bengal Asiatic Society for 1837, at page 968 Mr. Prinsep says—'General Ventura has also brought down with him some beautiful specimens of seals of the same age, which I shall take an early opportunity of engraving and describing.' Unfortunately this opportunity was lost by Mr. Prinsep's sudden illness. He had however sent me an impression of the principal seal referred to, (No. 15) which I will now describe.

No. 15. A plain thin cornelian, bearing a beautiful female head to the right, the hair plaited in two braids over the fore part of the head, and gathered into a large bow at the back, where it is tied by a ribbon, the ends of which float behind. Her shoulder is covered by a robe, from the midst of which her right hand appears, holding a lotus flower before her face. Inscription below in ancient Sanscrit, *Késava-Dásasya*, (Seal) of *Kesava-Das*, the servant of Vishnu.

At what period this lovely gem was engraved can only be ascertained approximately by an examination of the forms of the Sanskrit characters ; of which the letters *k* and *z*, and the inflected vowels are similar to those found in the inscription recording the repairs of the bridge near Lúnagurh, which we know must be subsequent to Asoka, or after B.C. 200 ; while the *s* and *sy* are of a later period, and similar to those found in the inscriptions of the Gupta family, which, in my opinion, cannot be later than A.D. 400. The peculiar formation of the *sy*, I consider to be one of the

best tests for ascertaining the age of a Sanskrit inscription, and therefore I feel inclined to believe that this seal is of the age of the Guptas. If the name may be considered as a titled declaratory of the religion of the owner of the seal, we shall have a direct proof that *Késava Dás* (the servant of Vishnu) was of the Braminical faith; which, coupled with the probable age which I have already assigned to this seal, would fix the period of its execution to the reign of one of the earlier Vaishnava Guptas, and before the date of the Saiva Skanda Gupta. In the same way, taking the name as a declaration of the faith of *Késava Dás*, we have a clue to the owner of the beautiful face engraved upon this seal, who can be no other than *Sai* or *Lakshmi*, the consort of Vishnu, and the goddess of wealth, beauty, and prosperity, who is usually represented with a lotus in her hand. It is even possible that this seal may have belonged to Chandra Gupta himself; for the small copper coins of that Prince (vide vol. 5. pl. 38. Fig. 13 and 14. J.A.S. of Bengal) bear a similar bust with the hand raised before the face, and holding a lotus blossom; beneath which is the Prince's name. This remarkable coincidence of subject between the seal and the coins, coupled with the similarity of the characters of the inscription to those of the age of the Guptas, still further strengthens the opinion which I have expressed above, that this seal was engraved during the reign of one of the earlier Vaishnava Guptas, towards the end of the fourth century after Christ.

The lithographer has completely failed in copying my sketch of this beautiful seal: for, instead of a frowning elderly lady, the original represents a young and lovely girl with a gentle smile upon her face. In beauty and excellence of workmanship this gem rivals the finest coins of the Bactrian Mint; the face is exquisitely delineated, and the position of the hand peeping out from the loose robe or Hindu *chadr*, is graceful and easy. Unfortunately on the gold coins of the Guptas there are no busts with which we may compare the delicate engraving of this seal; in my opinion, however, it is far superior to many of the Gupta coins, and is perhaps even superior to the best of them; with the small copper coins no just comparison can be made, for they are few in number, and are all deficient in preservation.

No. 16. A brooch set round with turquoises, presented to Mr. James Prinsep by General Ventura. The engraving is from a rough pen-and-ink sketch by Mr. Prinsep—Below the head is an inscription in ancient Sanskrit, *Sri Kodbharyasya* '(Seal) of Sri Kodbhara, the upholder or supporter of the fortress'. The initial *Sri* of this seal, which is of a later form than we find in the Gupta inscriptions, proves that

it must have been engraved subsequent to A. D. 450, the latest period which I can assign to any of the Gupta family.

No. 17. Likewise in the collection of General Ventura, there is a head upon this seal, but not so beautifully executed as that upon No. 15. The inscription, in ancient Sanskrit, is *Ajita Vermmasya*, (seal) of Ajita Verma. From the forms of the characters I should say that this seal was of the age of the Guptas.

No. 18. A red cornelian, in the possession of Mr. B. Elliott of Patna. This seal is very neatly engraved, and is no doubt as old as the most flourishing period of the Guptas, and perhaps even older. The legend of this seal will be found engraved as No. 15, pl. 53, vol. 6. J. A. S. of Bengal, where Mr. Prinsep reads it as *Sri Lokanāvasya*, (seal) of Sri Lokanava, or, the boatman of the world: but on the sealing-wax impression, which I have now before me, the legend is clearly *Sri Loka-chhāvasya*, (seal) of Sri Loka-chhava, or the ornament of the world; from *हवि* beauty or splendor.

No. 19. A chalcedonic agate, or *Sulimāni*, from Ujain, in the cabinet of the late Mr. James Prinsep. It is published in the J. A. S. of Bengal, vol 6. pl. 36, Fig. 23, where Mr. Prinsep reads the inscription as *Sri Vati-khuddasya*. '(Seal) of Sri Vati-khudd.*'

No. 20. A small agate, having the letters cut through an upper layer of milk white chalcedony. It was originally in Colonel Stacy's collection, and is evidently only a fragment, for on the left side marks of the cutting tools are still quite plain, while the other sides are polished. The left side is likewise perpendicular while the other sides are sloping towards the face of the seal. The remaining letters in ancient Sanskrit are.....*ttasya*. '(Seal) of.....(Da) tta.

No. 21. In the possession of General Court. It is an oblong seal, with a recumbent animal above the inscriptions, which is in ancient Sanskrit, and reads *Tiva-datasya*. '(Seal) of Tiva Datta,' or, the giver of wisdom.

No. 22. A copper seal, originally in the collection of Colonel Stacy, having a Bull butting to the left, with an ancient Sanskrit inscription on two sides, which is probably *Amogha-bhūtasā*. '(Seal) of Amogha-bhūta', or the mortal without vanity, that is, the humble individual. Now this the very title which Rajah Kunanda takes on his silver and cop-

* Of the same age as this seal is another small oval one from Peshāwur, (brought to my notice by Dr. Chapman) bearing the legend *Sri Kshatrapasya* '(seal) of Sri Kshatrapa' or the fortunate satrap.

per coins (see Nos. 2, 3, 4 and 7, vol. 7. pl. 32, J. A. S. of Bengal) the whole inscription being *Amogha-bhutasamaharajasa-rajnya-Kunandasa*, (coin) of the humble individual, the great king of kings, Kunanda. In the same way we find that the title of Aprati-ratha, or the invincible-in-his-chariot, which is applied in the Allahabad inscription to Samudra Gupta, is repeated upon his coins :—and I have no doubt therefore that the epithet of Amogha-bhuta on this seal refers to Kunanda, and that the seal is of the same age as the coins. But on the coins the legends are in two different characters, of one common language; the legend of the obverse being in Indian Pali; thus proving that these two characters were in contemporaneous use, and likewise from the occurrence of the *Indian* Pali on the *obverse*, or principal side of the coin, showing clearly that Kunanda was a native of India proper, and not of India beyond the Indus where the Bactrian Pali characters prevailed. The same fact indeed may be gathered from the use of *Indian* Pali *only* on the seal. But that he possessed territory upon the banks of the Indus is undeniably attested by the use of the *Bactrian* Pali upon his coins, and by the localities in which they have been discovered, some of which are to the westward of the Indus, even as far as Kabul. Such being the extent of his territory, it now only remains to ascertain at *what period* a prince named Kunanda reigned over Northern India and the Punjab. In the first place then we know by the shape of the letter *m* that this seal must be anterior to the period of the Guptas, and the same may be said for the coins, on which also we have the additional evidence from the forms of the *h* and *n*, that Kunanda cannot be later than Asoka. The occurrence of Bactrian Pali on his coins is likewise in favor of this early date, for that character appears to have fallen into disuse towards the close of the second century after Christ, or perhaps a quarter of a century later, when the followers of the Brahminical faith, with the assistance of the Agniculas (whom I believe to have been the fire worshipping Sussanians) had gained the ascendancy in India over the votaries of Buddha. The use of the Pali termination *Sa*, for the Sanskrit *Sya*, proves that Kunanda was a Buddhist, and this is still further confirmed by his title, which whether it be read as *Amogha-bhuta*, the humble mortal, or as *Amāya-bhuta*, the guileless mortal, which is perhaps the preferable reading, is in strict accordance with the professed meekness and lowliness of a zealous Buddhist, and is at the same time utterly at variance with the grandiloquent titles assumed by the arrogant Brahmanists. We have thus deduced that Kunanda, who ruled over Northern India even beyond the river Indus, was a Buddhist Prince, and that he flourished certainly not later

than the reign of Asoka. Now it is almost certain that the successors of Asoka were driven out of the country upon the Kabul river by the Bactrian Greeks under Demetrius the son of Euthydemus, and it is quite certain that from the period of the war between Eueratides and Demetrius 'King of the Indians,' until the decay of the Indo-Scythian power about A. D. 220, no Hindu Prince ruled over the territory on the banks of the Indus. We have thus two distinct proofs that Kunanda cannot have flourished later than the era of Asoka, and since we cannot identify him with that prince whose other name was Piya-dasi, we must look earlier in the list for some king whose recorded history will agree with the deductions made from our examination of his seal and coins. The name given in the Grecian authors to Asoka's father is Amitrochates, which can only be the corruption of some title assumed by Bindusara, but notwithstanding the near coincidence of sound which Amitro-chates bears to Amaya-bhuta or Amogha-bhuta, it is quite impossible to identify them, as the first was a Brahmanist, while Kunanda, as we have shown, was a Buddhist. It is equally impossible to identify him with the Brahminical Chandra Gupta Maurya; but amongst his immediate predecessors, the *nine Nandas*, the only difficulty seems to be with which of them he is to be identified. This is however a matter of little consequence, as the elder Nanda Mâhâpadma, and his eight sons reigned conjointly for one hundred years previous to the accession of Chandra Gupta, in about B.C. 312. The nine Nandas were therefore contemporaries of Alexander the Great.

Of the first Nanda Mâhâpadma it is said in the Vishnu and Bhâgavut Purânas 'he will bring the whole earth under one umbrella, his rule being irresistible.' He was therefore a powerful monarch. That he was a Buddhist however, I cannot affirm; although the following passage from Wilson's translation of the Mudra Râkshasa, would seem to countenance the opinion that the Prince and even his councillors were of that faith. See Hindu Theatre, vol. 2 pp. 159 60, where Chânakya the Brahman says,

There is a fellow of my studies, deep
In planetary influence and policy,
The Brahman Induserma; him I sent,
When first I vowed the death of Nanda, hither;
And here repairing as a *Bauddha mendicant*,
He speedily contrived to form acquaintance
And friendship with the royal councillors.
Above them all does Râkshasa repose
In him implicit confidence.

It is hardly possible that King Nanda and his councillors would have admitted a *Bauddha mendicant* to their *friendship*, had they been Brah-

manists; for there can scarcely have been less pollution to a Hindu in the friendship than in the contact of a Buddhist. The Bhāganat Purāna also says that Nanda and his successors were 'Sudras, void of piety.' The Vishnu Purāna adds that he was avaricious; and they both agree in stating that a Brahman was the chief agent in destroying the nine Nandas. Avarice and want of piety are the usual sins attributed to any Prince who neither respects nor entertains the Brahmins; and such sins would of course be committed by *every Buddhist King*; who like Asoka would have turned out all the Brahmins supported at the royal expense and have entertained Buddhist priests in their place. I cannot therefore help suspecting that as a Brahman was the chief conspirator against the Nandas it is more probable that the rebellion was only a religious struggle for political ascendancy, in which the Brahman Kautilya succeeded in establishing the authority of his own caste and religion under the new King Chandra Gupta; than that it was a justifiable uprising of the people, occasioned by the avarice and tyranny of Nanda.

Nanda himself was called Mahapadma; his wife was called Sumanda; and his eight sons, according to the Vishnu and Bhāganat Purānas, were 'Sumalya and others.' To one of these nameless princes then I would attribute this seal, if not to the elder Nanda Mahapadma himself, to whom the coins almost certainly belong:—for it appears from the Rajah Taringini that the younger or junior Rajas were not allowed the privilege of coining in their own names; and therefore the eight sons of Nanda, who reigned conjointly with their father can scarcely have struck any coins:—but whether the seal belongs to the father or to one of his sons, its age is not affected by the uncertainty; and we may therefore consider it as old at least as the time of Alexander the Great.

No. 23. Copper.—This seal cannot I think be more than three hundred years old, and perhaps not even so much. The inscription in modern Devanagari is *Sri Hara Deva-ji sahāya parāmanda*. The fortunate Hara Dēva, the companion of happiness.

ALEXANDER CUNNINGHAM.

Note.—A gem identical with No. 2 of the plate supplied me by Lt. Cunningham is noted by Bayer (the first investigator of Bactrian history) as No. 37 in the splendid collection of gems belonging to Martin Von Ebermayer, a wealthy merchant of Nuremberg, which he illustrated in a very erudite work under the following title:—'*Gemmarum Affabre Sculptarum Thesaurus, quem suis sumptibus haud exiguis, nec parvo studio collegit Io. Mart. ab Ebermayer.*' The engravings of the collection which accompany the letter press are exceedingly well executed: a copy of the work (Fol. ed. prin.) is in my possession and now lies before me. The design, from Bayer's note upon it, would appear to have been a favorite one; he speaks of two other gems (Thes. antiq. Græc.) not dissimilar, which Angustin held to represent not *Omphale* but *Iole*, but he afterwards abandoned that opinion, and declared the figure (as did also Begero

Mode of taking facsimiles of coins.—By VINCENT TREGEAR, Esq.

The coin is placed between two dices of lead, and the whole compressed, either by a lever or screw, till the coin is well indented into the lead, from which latter impressions, the wax ones are made, and, being in relief, are of course far better than if taken from the coin itself.

To form the dice, a piece of plank, about one-third of an inch thick, is bored though with a centre bit somewhat smaller than the coin to be copied, it is then cut into halves, to facilitate the removal of the lead which is cast into it, the mould being placed in a piece of smooth wood, or still better, on a piece of dry brick rubbed very smooth. The bottom of the dice may not be smooth at first but will be so after a few castings have heated the brick, or it may be heated on the fire while the lead is melting. The best mould is a brass ring, the hole being bored or turned slightly conical then by merely raising it the lead falls out; it should be laid on a piece of brass nicely polished, which will give the lead a bright smooth face. A screw press is the best, but a simple lever will answer every purpose; care being taken to keep all level that the coin may sink equally into the lead, and the pressure must be removed when the edges of the lead meet or nearly so, according to the thickness of the coin. There is very little danger of injuring the coin, the lead being the softer metal, but if from any cause, the relief, for instance, on one side falling opposite a hollow or plain surface on the other, there should be a chance of deforming it, the best plan is to take each side separately, the opposite one being imbedded in sealing wax.

To obtain a perfect impression from the leaden dice they should be heated, which is most conveniently done by melting a small quantity of sealing wax* and leaving the dice on it while the wax for the impression

Thes. Palat') to be none but *Omphale*, 'accuratiore carminis *Ovidiani* consideratione inductus, 'as Bayer informs us. He himself is cautious as to giving a decisive opinion, saying in his description of the gem, 'IOLE, nisi potius *OMPHALE*, amasia *HERCULIS*, ejus en clavum, et leoninum integumentum jocose oblatum gestat.' The identity of the design could not be more satisfactorily proved than by the 'jocose oblatum' of Bayer, compared with Lt. Cunningham's similar expression. This instance of the discovery in the East of the duplicates of gems of Grecian origin extant in the West is not the only one which I shall shortly have it in my power to cite, presenting more remarkable features than those of mere identity.

A gem (No. 4, Tab. VI.) of the Ebermayer collection is also nearly identical with No. 9, of the plate before us. It represents with better execution, a crow seated on, instead of *beside* (as in No. 9), a low shrub, in exactly the same attitude as in our gem. This may represent the crow, Bayer suggests, sacred to Apollo, 'nisi rectius censuit (l. c. 16) Gronovius, quod sit *cornix ab ilice pradicens* decantata Virgilio.' The attitude and expression of the bird fully favour the ingenious suggestion, but it is singular to find a passage in the *Bucolics* Ed. IX. illustrated on a gem from Afghanistan.

* This wax can be used to heat several seals with.

is preparing, for the latter an argued lamp is the best as it does not discolour wax, a quantity must be dropped on a card sufficient to form the seal, and then the whole re-heated and the warm lead pressed down while the wax is very hot, but not so long as any air bubbles continue to rise, and it would be better to mix the wax with a thin bit of stick, drawing it somewhat towards the centre; the lead should not be removed until the wax is quite hard, and then, if the operation has been carefully performed the impression will be found as perfect as the coin itself. I have found the common hard yellow wax of the bazaar to take the most legible impression and would recommend the use of it in preference to any other colour.

I beg to suggest that the Society make a collection of such impressions, which would be valuable as a means of reference, particularly in the case of such coins as are taken from the country. They should not be shut up in a cabinet, but placed in frames, formed of a thick plank bored with holes of a fit size and covered with a glass front fitting close to the surface of the wood—the metal of the coin might be indicated, as in engravings, by its initial letter placed between the impressions; and the legend written above it, the whole classed and arranged in chronological order as far as possible. For the sake of uniformity the Society might decide on a particular coloured wax to be used in all impressions made for their collection, and the cards used should be left uncut, to be subsequently fitted to the holes in the frames which, of course, would be all of one size.

The Society would thus have the benefit of a large collection without any expense, and I have no doubt that every one who has a collection would gladly take the little trouble required to furnish copies of his coins. I must repeat there is no danger of harming most coins, as my friend Capt. Cunningham and myself have subjected our own to the ordeal without injury.

Report on the Soda Soils of the Barramahal. BY CAPTAIN CAMPBELL, ASSISTANT SURVEYOR GENERAL.

Soda soils are very common in the principal plain of the Baramahal in the Salem District, which is bounded on the North by the Hills of Congoondy, on the East by the Jawaudy Hills, on the South by the abrupt break in the levels at the Topoor Ghaut, and on the west by the hills of Roycottah.

In extent they are generally not more than about $\frac{1}{2}$ a mile square; the

soil is sandy and incapable of supporting vegetation, no herb growing on them, but a scanty scrubby grass. In general they lay upon a bed of Kunkur, which is sometimes, as near Paulcode, of considerable depth.

These beds of soda soil are well known to the natives, who call them in Tamul, Chour Munno—and extract the soda for the purpose of fluxing powdered white quartz to make bangles with. The Dhobees also collect the earth, and by lixivating it make a solution of soda which they use in washing clothes by adding quick lime, to make the solution caustic. But so ignorant are they in general of the principle of the mode of use, that they often convey the earth sometimes fifty miles, not being aware that the labour of carriage might be decreased by extracting the salt.

The Bangle makers extract the impure soda by mixing the earth with water in a pit, and allowing it to settle, the solution is then drawn off, and evaporated by sprinkling it on cowdung spread upon the surface of a granite rock. When the cake has become about half an-inch in thickness, it is taken off and is broken into pieces, in which state it is called Chour Billah and is stored in houses for use, sometimes to the amount of 400 maunds.

The Chour Billah is sold at the rate of $17\frac{1}{2}$ Rupees per ton, and contains 23 per cent. of insoluble matter, the soluble part being in greatest part all carbonate of soda with a little vegetable and extractive matter, and some muriate and sulphate of soda in small quantity. A solution of it will not crystallize in consequence of the extractive matter, and the natives are quite ignorant of the mode of crystallizing it, and do not even know that it contains a salt.

In Bengal soda soils are also found, but according to Dr. O'Shaughnessy, (Manual of Chemistry, page 227) it contains 15 per cent. of sulphate of soda, which salt being more soluble in hot than cold water cannot be separated by crystallization from the carbonate, and the product of these soils in Bengal cannot therefore be applied to any useful purpose unless the very expensive process of decomposing the sulphate by fusion in a furnace is resorted to.

Being engaged in an extensive chemical examination of the minerals of this district in which pure carbonate of soda is required in considerable quantity as a flux, and as the price of the salt as vended in retail at Madras is very great, it has occurred to me to endeavour to supply the want from the mineral resources of the country.

I have found by experiment that a very pure carbonate of soda may be separated from the crude soda, which the soils of Barramahal yield by simply charring the Chour Billah, or the residue, after evaporating to dry-

ness in a gentle heat, by which the extractive and vegetable matters are converted into charcoal, and can then be simply extracted by filtering, and the solution will then crystallize on evaporating to a *pellicle*. The first crystallization gives a tolerably pure soda, coloured a little by the impurities, but after crystallizing 3 or 4 times the crystals are beautifully white and transparent, and after six crystallizations, the salt is so pure as hardly to give any precipitate with nitrate of silver or nitrate of barytes after supersaturation with nitric acid, denoting thereby the nearly total absence of any muriate or sulphate.

In England great quantities of carbonate of soda are required in glass making, soap making and dyeing. This was formerly prepared from the Spanish Barilla, which contains, according to Dr. Ure, muriate and sulphate of soda, lime and albumina, and only at most 24 per cent. of soda. A large quantity was also made from kelp prepared in the Scottish Isles, but this is no longer manufactured, as it has been found that in consequence of the cheap price of sulphuric acid, soda can be manufactured by decomposing the muriate of soda (common salt) at a price which remunerates the manufacturer.

In this operation the muriate is first decomposed by heating it in leaden vessels with sulphuric acid, by which the muriatic gas is driven off and which is condensed and allowed to run to waste as of no value, the demand in the arts for muriatic acid being very small. The resulting sulphate of soda is then mixed with charcoal and some lime, and is roasted by a powerful heat in a reverberatory furnace by which it is partly decomposed and formed into sulphurate of soda, which by further heat and stirring is again decomposed and the sulphur volatilized and an impure mixture of carbonate of soda ashes, and charcoal results, which is called in trade 'black balls,' and is an article of commerce.

This impure product is then further purified by solution in water, filtering, and evaporation to dryness without crystallizing, in which state it is called 'Soda Ash' and is used by the glass blowers.

The salt is still very impure, being mixed with sulphate and muriate of Soda, and does not contain its full equivalent of carbonic acid, being in fact a mixture of caustic and carbonate of soda.

For the makers of plate glass who require a very pure carbonate of soda as a flux, to prevent the chance of the glass being discoloured, the soda ash is mixed with sawdust, and is again fused in a powerful furnace, by which it is fully carbonized and rendered capable of crystallizing. It is then dissolved in water, and is crystallized once for the use of the plate glass makers, and six or seven times for the use of apothecaries. In the

latter state it is sold for 10 pence per pound retail or 52 per cent wholesale. In this state I have found by experiment that the article is exactly the same as the product before described, and the two are therefore equally valuable.

For the plate glass makers the necessity of having the flux pure is so great, that the expensive process of decomposing common salt by pearlash (carbonate of potash) is sometimes resorted to and the resulting muriate of potash being a little crystallizable, the carbonate of soda is separated by evaporation and crystallization.

The cost of manufacture from the Indian mineral soda cannot be ascertained but by extensive experiment, but as it will be seen that the process I have described, is very much the same as that in making saltpetre, the inference, that the expense will be nearly the same in both manufactures, may be allowed, and as saltpetre is made for 2 Rupees per maund, therefore it would seem that nearly pure carbonate of soda can be manufactured in South India for less than 5 Rupees per cent.

As the soils which yield this product, are now quite unproductive, and the time required for the manufacture is during the dry weather when the ryots are unemployed, the agricultural produce cannot be affected while the revenue will be certainly increased.

While the cotton trade of South India is so rapidly increasing, an article for export which will serve the purpose of dead weight for ballasting the ships will be much required, and as carbonate of soda is not affected by exposure to air or damp, it may be packed in bags and will be useful for the purpose.

As these soils are of limited extent, and as the manufacture cannot be carried on during the whole year, therefore the produce must always be limited, and the introduction of the article into the markets of England, cannot affect the present market price, because the quantity yielded in India can only take the place of a certain quantity now produced by the manufacturers of England, and the price will always therefore be regulated by that at which the English manufacturers can afford to sell.

On the introduction of the Indian Soda to the market of England the manufacturers will doubtlessly endeavour to prevent its sale by endeavouring to undersell it, even going so far as to sell their own manufacture at a loss, but as it has been shewn that the Indian Soda can be made for little more than 10 shillings per cent., it would seem impossible that the endeavour to exclude it from the English markets could be successful.

I have been unable to procure certain information regarding the price at which the inferior kinds of impure Soda are sold in England, but when the expensive and laborious process as above described, is considered, it seems almost impossible that any product can be made at so cheap a rate, as that procured by the simple manipulation required for the mineral salt.

I have endeavoured by sending to England samples through a commercial gentleman to make this report more complete, by being able to state the value of the article on certain grounds, but have been unsuccessful, the point appearing to depend in great measure on the import duty which will be charged in England. By the present regulations, natural alkali imported from places within the limits of the Honorable Company's charter pays a duty of 2 shillings per cent. but to ascertain the point it appears to be necessary to ship a few tons, and then try by experiment at what rate of duty the article will be admitted.

I am aware that some years ago attempts had been made to introduce Indian Soda into the English market, but which failed in consequence of the opposition of the English manufacturers, but I submit, that the soils now pointed out, yielding by single crystallization a pure Soda, were not before known, and in consequence, in the former experiments to which I refer, it became necessary to fuse the salt for the purpose of purifying it, which expensive process of course prevented a successful competition with the manufacturers of England.

Report on the Kaolin Earth of Mysore.—BY CAPT. J. CAMPBELL,

Assistant Surveyor General.

A great portion of the level surface of the table land of Mysore, is formed of a red ferruginous arenaceous earth, resembling much some of the softer varieties of the upper red sandstones of England.

This formation, which may be called for convenience 'Red Marle,' is superposed upon a continuous bed of hornblende granite, and is connected with it by a graduation, both in structure and composition, through an interposed layer of white kaolin earth which is found between the two.

The kaolin is in some places several feet in thickness, and is generally of a pure white colour, and soft greasy feel, and is sometimes mixed with a fine quartze sand in small quantity.

This kaolin is mentioned by Dr. Heyne, who mistook it for pipeclay.

The extent of this bed of kaolin I have not had an opportunity of ascertaining, but I know that it is found from Bangalore as far north as Nundydroog.

That this kaolin is fitted for the manufacture of the finer kinds of pottery and porcelain I have been able to ascertain by direct experiment, in consequence of the laborious process, and, to an individual, expensive apparatus required to grind it down to an impalpable powder, by stones of hornstone under water: but from its mineralogical characters I believe there can be little doubt of its being of finer quality than many kinds in England.

My attention was called to the mineral in consequence of being engaged in researches on the fusibility of the rocks and minerals of the Salem district, generally called igneous, in which it was necessary to expose them to a very high degree of heat, in a wind furnace sufficiently powerful to fuse cast steel, and for which I could procure no crucibles at a sufficiently cheap rate, and I have found this kaolin, when mixed with an equal quantity of finely pounded quartz, to fully answer the purpose of affording crucibles and covers, upon which the most intense heat has hardly any effect, the outside being only slightly glazed by the alkali of the fuel, and the crucible being very slightly softened. They are also much superior to those called Hessian, in not cracking, unless by very extreme changes of temperature.

In Calcutta, there are probably many manufactories carried on in the fusion of metals, &c. where this earth would be of great value, and it might even be useful in the manufacture of fire bricks, for lining furnaces, &c., if the carriage by land for 200 miles would not render them too expensive.

At Madras, at the mint for making mufles and crucibles, at the Gun Carriage manufactory, and in several other manufacturing depots, this kaolin might be useful; and a manufacture of the articles might be either established at Bangalore, or the earth itself might be transported.

Coarse Chinaware is an article of import from China, and plates of this ware are purchased in considerable quantities by some of the Natives at 4 annas each, while it is reasonable to suppose that these articles might be manufactured in Mysore at a cheap rate, without the necessity of any very expensive machinery being required.

Proceedings of the Asiatic Society, Wednesday Evening, 5th May, 1841.

THE HONORABLE SIR E. RYAN IN THE CHAIR.

Library Museum.—Calcutta Monthly Journal for March, 1841,
No. 76, P.
The Christian Observer, for May, 1841, New Series, Vol. 2d, No. 17, P.
Annals and Magazine of Natural History, Dec. 1840, No. 37, P.
Ochterlony's Mineralogical Report upon a portion of the Districts
of Nellore, Cuddapah and Guntoor. Madras, 1841, P.
Samlede Afghandlinger, of R. K. Rask. Kobenhavn, 1838, Tredie
Del. 8vo. 1

At the meeting of the 7th of April last it was resolved to refer to the committee of papers (with reference to the offer of Mr. H. B. Koing, Bookseller at Bonn, to be entrusted with the sale of the Society's Oriental works) to consider the prices of those works and to reduce them to a scale suitable to the means of the scholars and students of Germany. Dr. Hæberlin submitted the following list exhibiting the rates at which he suggested the books should be priced, viz.

Mahábharatá, with contents	Rs. 40
Large paper, ditto ditto	" 50
Harriwansa	" 5
Rajah Tarangini	" 5
Large paper	" 8
Naishada	" 6
Fátáwe Aleurgiri	" 8
Ináyá	" 8
Kházánat ul Ilim	" 8
Jawáme ul Riazi	" 4
Anis ul Musharrahín	" 5
Sharaya ool Islam	" 8
Tibetan Grammar	" 8
Tibetan Dictionary	" 10
Researches	" 10

Ordered that the reduced rates be adopted and the list printed in the Journal of the Asiatic Society for guidance, that Mr. Koing's services be accepted and a selection of the Oriental Books be made and forwarded to him by the first favorable opportunity, with suitable instructions, as well as regards the disposal of the books as of the funds which may from

time to time accrue in his hands as sales are effected.

Read the following Report submitted by the Officiating Curator for the month of April last.

H. TORRENS, Esq., *Secretary Asiatic Society.*

SIR.—My report on the Museum, for the month of April, is as follows :
Geological, Mineralogical and Palæontological Department.—We continue to arrange and catalogue here at all spare times. Amongst the collections lately arranged are Capt. Hutton's valuable geological series, the fruits of his journey to the Spiti valley, to the expenses of which the Society I think contributed very liberally. The duplicates of this collection have been sent home to the Court of Directors, but we are sadly in want of the catalogue to it, were it only that of the localities. You have I believe addressed Capt. H. on this subject.

We have, at last, obtained the first of our printed catalogues from the press, and as completed copies will be placed in the cases, a part of the Palæontological collections are labelled, and of these also we shall soon have printed catalogues. Our Index, which is wanted at every turn, has not yet appeared.

Osteological Department.—We have here at length been able to place all our small skeletons in two neat glass cases. The large, skeletons have been supported by side bars to the upright supports as suggested by the Hon'ble the President, and all the skeletons have labels. We have added here the skeleton of Mr. Ewbank's Leopard, as reported in my last.

Museum of Economic Geology.—The Catalogue and arrangement of the copper series is completed.

Mammological Department.—*Reptiles, Fishes.*—Nothing new to report.

Ornithological Department.—We have here added nine new specimens, mounted, eight of which are part of Lieut. Tickell's collection, and one Faleo is from Mr. White of Midnapore.

Presentations this month have been the Gud Faleo, stuffed and mounted, from C. P. White, Esq., Midnapore.

I am, Sir, your's, very obediently,

H. PIDDINGTON,

Officiating Curator, Asiatic Society's Museum.

Museum, 30th April, 1841.

With reference to the want of a Catalogue of Captain Hutton's valuable Geological Collections of the Spiti Valley, noticed by Mr. Piddington in his

Report, it was resolved that a communication be made to that Officer for furnishing one.

The Secretary reports the receipt of a letter dated the 20th April last, from Lieut. W. I. E. Boys of the 6th Light Cavalry, offering a large collection of objects of Natural History, 'which in making had occupied almost his sole attention for the last seven years.'

'The Collection,' writes Lieut. Boys, 'has been made and the objects prepared only by myself, and I believe myself warranted in saying that nothing superior has ever been made in that line, as no expense has been spared. It consists of upwards of 350 species of Birds, the whole collected within 50 miles of Mhow Malwa, and of upwards of 200 white glass bottles containing every variety of Snakes, Scorpions, Centipedes and other reptiles, together with the fishes of different parts of India, in spirits, a quantity of Alligators and Gavialis, Boas, &c, several species of the River Turtle and Tortoises, and a superb collection of Insects.'

The whole Lieut. Boys' offers for Rs. 6,000, a sum much below their real value.

It was resolved that before coming to any final decision on Lieut. Boys' offer, that that Officer be requested to furnish a descriptive Catalogue of the collections referred to.

Read a Letter from Lt. A. Cunningham of Engineers, dated 29th April last, advising the dispatch of coins purchased from him by the Secretary for presentation to the Cabinet of the Asiatic Society. Lt. Cunningham adds, 'I have decided upon publishing as complete a work upon our Indian coins as can be made. It will take some months to complete the plates, but I have already done three of them. The 1st Vol. will contain the coins of the Bactro-Grecian, Indo-Grecian, Indo-Parthian, and Indo-Scythian Princes of Bactriana, Ariana and the Punjab. It will contain 20 Plates and about 150 pages of letter press, or perhaps 200 pages, and will I hope be ready by the 1st January next. The title of the work will be 'Coins of Alexander's successors in the East.'

In another letter that Officer also writes:—

'I have just read the only one of all my Kashmeerian coins which had hitherto baffled me. Sri Foramâ (na). Now Toramâna was the Zuvarâja (or Cæsar) in A.D. 450, and was imprisoned by his elder brother (the Augustus) for coining money in his own name; and here we have the identical coins that caused Toramâna's imprisonment and also a decided proof of the truth of the Kashmeerian history. I have the coins of 14 Rajahs, and of six Moosulman Kings, making a series of 20 Kings, the most numerous of any Indian sovereignty that has yet been discovered.'

The Secretary informed the meeting of Lt. Cunningham's having declared himself a convert to the identification of the supposed *Mayas*, held by several authorities to have been one of the early Bactrian Monarchs, with Demetrius, a position originally suggested, and maintained at some length, by the Secretary, in No. of the Journal of the Asiatic Society.

Read the following Letters, viz. From the Secretary, Political Department, Government of India, No. 1077, dated the 26th April 1841, transmitting a Report by Mr. Asst. Surg. Walker, on the Geology and Manufactures of the Hunum Koondah district of the Nizam's Dominions, for such notice as the subject may merit.

N.B.—Specimen of produce, as Indigo, &c. &c. from the province in question, have been since received, and will be submitted to the Society at their next meeting, with the Curator's report upon the objects to be submitted.

From Mr. C. P. White of Midnapore, of 19th April 1841, sending a specimen in Ornithology for the Society's Museum.

From Mr. R. Clarke, Hony. Secy. Royal Asiatic Society, London, dated 7th November 1840, acknowledging the receipt of the Journal for November and December 1839, and the Mahabharata, Vol. IV.

Read a letter from Major Thoresby, Jyepore, 5th April 1841, apprizing the dispatch of the stone at the gorge of the Teoree Ghat near Buerath, bearing the Palee Inscription in ancient characters, a copy of which was taken and forwarded to the Asiatic Society by Capt. Burt. Also some specimens of ores of the mines in the Khetree hills.

The Secretary submitted to the meeting, presented by Robert Torrens Esq., the Magistrate of the 24-Pergunnahs, a quantity of coins of the Mussulman Kings of Bengal, found by a Gang of convicts employed on the Roads at Howrah. The coins, as read by the Hon. H. T. Prinsep, Esq., are as follows :

N.B.—O. and R. stand for obverse and reverse of the coins.

No. 1. O. Alwasik bu tued ul Rhuman abooul Moojahid Secunder Shah ibn Ulyas Shah ussooltan.

R. Yumeen ul Khuleefut Illahi Nasir ameer ul moomuneen,
Oun ul islam oo ul moosulimeen; Khuladu Moolkuhoo.
(Circular legend not legible.)

No. 2. O. Ulsooltan ul adil, Ghums ood dunya oo ood deen, Abou ul Moozuffur, Ilyas Shah ussooltan.

R. Sekunder oosanee Yumeen ul Khuleefut, Ameer ul Moomuneen.

- No. 3. O. (*broken*) Ussooltan ul adil, Aboo Moozufur Secunder Shah, Ibn Ulyas, Shah ussooltan.
 R. Yumeen Khuleefut Illahi, Nasir, Ameer ulmoomuneen, Oun ul Islam oo ul mooslumeen.
- No. 4. O. Aboo ul moojabid Secunder Shah, Ibn Ilyas Shah ul Bengallee.
 R. Nasir, Ameer ul moomuneer, Oun ul Islam oo ul mooslumeen.
- No. 5. O. Julal oodunya oo uddeen, aboo ulmoozufur Mahomed Shah.
 R. Nasir, Ameer ul moomuneen Oun ul islam oo ul moosulmeen
- No. 6. Ditto to No. 5.
- No. 7. Ditto to No. 2.
- No. 8. O. Mahomed Shah. (*Togra*).
 R. The Kulma or profession of faith.
- No. 9. (*Ditto*) Mahomed Shah.
- No. 10. O. Syfooddunya oo ooddeen, aboo ul moojanid Khoosro Shah, Ibn Azim Shah, Ibn Secunder Shah, Ibn Ulyas Shah, ussooltan.
 R. Nasir, &c. &c. &c.
- No. 11. O. Shah ul Azim aboo ul Moojahid Secunder Shah, Ibn Ulyas.
 R. Ullah Nasir, Ameer ul moomuneen, Oun ul Islam.
- No. 12. O. Julal ooddunya oo ooldeen, Aboo ul Moozufur Mahomed Shah ussooltan.
 R. Nasir oo Islam oo ul moosulmeen, Khuluda Moolkaoo !
- No. 13. (*Too much defaced and chiseled to be legible.*)
- No. 14. O. Ulyas oodunya oo oodeen uboo ul moozufur Azim Shah, Ibn Secunder Shah, Ibn Ulyas Shah ussooltan.
 R. Nasir, &c. (as before.)
- No. 15. O. Sooltan ul adil Julal oldunya oo ooddeen aboo ul mujahid Mahomed shah ! khuladu moolkuhoo !
 R. Nasir ameer ul moomuneen, Oun ul Islam oo ulmooslumeen.
- No. 16. (*Togra like No. 8: nearly illegible.*)
- No. 17. (*Ditto to No. 14.*)
- No. 18. O. Ghyas ooddunya, oo oodeen, ul mulik Azim, Shah oosoltan.
 R. Nasir, ameer ul moomuneen, Oun ul islam oo ul moosulmeen.
- No. 19. Ghyas ooddunya oo oolden, aboo ul moozufur Azim Shah, Ibn Secunder Shah, ibn shums ooddeen.

No. 20. (*Ditto to No. 14.*)

No. 21. O. Ul mowukul bu taced ul Ruhman, Ghums ooddunya, oo ooddeen, Malik Yoozbuk ussooltan.

R. Nasir, &c. &c.

No. 22. O. Ul mooyud bu deen ul Ruhman Ghums oodunya oo ooddeen, Aboo ul moozufur Mahomed Shah Ulyas.

R. Nasir Ameer, &c. &c.

No. 23. (*Ditto to No. 14.*)

No. 24. (*Ditto to No. 14.*)

No. 25. O. Syfood dunya oo ooddeen, Aboo ul moozufur Khoosroo Shah, Ibn Aeezim Shah, Ibn Secunder Shah, Ulyas shah ulsooltan.

R. Nasir, &c. &c.

No. 26. (*Ditto to No. 5.*)

No. 27. O. (*Ditto to No. 2.*)

R. (*defaced by chiseling.*)

No. 28. O. Ul Mooyud bu taced ul Ruhman.

R. Nasir ooddeen aboo ul moojahid Mahomed Shah ussooltan

No. 29. O. Aboo ul Moojahid Sekunder Shah, Ibn ulyas Shah, ussooltan.

R. Ulla nasir Khuleefut Ameer ul Moosulmeen oun ool Islam, oo ul Moosulmeen, Khuluda Moolkuhoo.

No. 30. (*Ditto to No. 5.*)

No. 31. O. Ula ooddunya oooddeen Aboo ul Moozufur Mahomed Shah.

R. The *Kulma*.

(The *Toghra* of this coin is more legible than usual.)

Of the above numbers 8, 9, 16, 28 and 31 appear to be of Mahomed Shah afterwards King of Hindostan, who reigned A. H. 627 to 634 (A. D. 1229 to 1236.)

Numbers 2, 7, 22 and 27 are of Ulyas or Ilias Shah, who reigned from A. H. 744 to 760 (A. D. 1343 to 1358.)

Numbers 1, 3, 4, 11 and 29 are coins of Secunder Shah son of Ulyas Shah, who reigned from A. H. 760 to 769 (A. D. 1358 to 1367.)

Numbers 14, 17, 18, 19, 20, 23 and 24 are of Azim Shah, son of Secunder Shah, who reigned from A. H. 769 to 775 (A. D. 1367 to 1373.)

Numbers 10 and 25 are of Syfood deen (Khoosroo Shah) son of Azim Shah, who reigned from 775 to 785 (A. D. 1373 to 1383.)

Numbers 5, 6, 12, 15, 26 and 30 are of Mahomed Shah, who reigned from A. H. 794 to 812 (A. D. 1392 to 1409.)

The coin No. 21, bearing the title of Ghyas ood-deen Malik Yoozbuk would appear to belong to the king, who in the list of Pathan Monarchs of Bengal (Prinsep's Useful Tables) is noted as Ikhtiar ood-deen *Malik Yoozbuk*, the only king who bears this remarkable name. The thanks of the Society were offered to Mr. Torrens for his valuable contribution, which will be deposited in the cabinet of numismatology.

Also an old coin forwarded by Capt. Hannington, picked up in the district of Manbhoom; doubts were entertained as to the real nature of the so called coin. It is of pewter; the marks, or characters unintelligible. Further enquiry will be made on the subject, as, if it be indeed a coin, the discovery is singular, and may be ultimately highly valuable.

Read Mr. Secretary Bushby's Letter, No. 838, dated the 14th April 1841, in reply to the communication of the 12th idem, with the officiating Curator's report on the two specimens of rock, of which the following is a copy:

To H. TORRENS, ESQ., *Secy. to the Asiatic Society.*

Sir,—In reply to your letter and its enclosure of the 12th instant, I am directed to acquaint you that the Military Board will be requested to instruct the Superintendent of the Agra and Bombay road, to endeavour to procure the specimens and information suggested by the Officiating Curator of the Asiatic Society's Museum.

2d. The Right Honorable the Governor approves of Mr. Piddington's proposition to supply all officers engaged in the Survey and Construction of roads with a copy of Capt. Tremenheere's Memoir.

I am, Sir, your obedient servant,

G. W. BUSHBY,

Secretary to the Govt. of Bengal.

Fort William, 14th April, 1841.

The officiating Curator submits the following report of 17th April 1841, on the collection of minerals tendered for purchase to the Asiatic Society by Mr. Dodd.

To H. TORRENS, ESQ., *Secretary Asiatic Society.*

Sir,—With reference to the letter of Mr. Secretary Bushby on the subject of the collection of minerals tendered for purchase to the Asiatic Society by Mr. Dodd, I have the honor to report that in consequence of that gentleman's having failed as yet to transmit me his catalogue I have been obliged to make a rough one of the collection which has occasioned delay in furnishing the report.

The collection consists of about 890 specimens in all; of which about 180 may be genera and the remainder species and duplicates. The ac-

knowledge genera of minerals being about 360 in number ; Mr. Dodd's collection comprises thus about one half of the whole and generally of the most useful for reference.

With this collection and those in the Society's cabinet, we should be able to form a nearly perfect series, which is in this country a great scientific desideratum, for but few have the time, or the knowledge required to enter upon a chemical examination of a mineral, and comparison with the specimens of a well arranged cabinet will in very many cases obviate the necessity of this. The duplicates also will not be useless if (as suggested I think in one of my previous reports) they be used in the formation of ' Cabinets of Instruction' for the Hindoo, Medical and other Colleges and public establishments, whenever it may be thought proper to furnish them with such.

As far as I am acquainted with the prices of such things at home—though in this respect my knowledge is very limited, I should judge that the price asked is not excessive, and we may possibly obtain it at a cheaper rate.

I have the honor to remain,

Sir, your obedient servant,

H. PIDDINGTON.

Assistant Curator Asiatic Society.

Museum, 17th April, 1841.

Resolved that a copy of Mr. Piddington's report be submitted for the information of Government, in reply to Mr. Bushby's Letter No. 270 of the 24th March 1841.

Read a letter from Captain F. Jenkins, of 1st April 1841, requesting to be supplied with extra Copies of Lt. Tickell's papers on the 'Ho' language for comparison with the numerous languages current within the valley of Gowhatti, and to trace the dialects connected with the Tibetan stock, and the Shan branch. Captain Jenkins writes, ' that the most distinct language in all this Frontier seems to be the Garrow, as its compound and polysyllabic character appears to separate it entirely from the Eastern languages, and yet it does not appear to have the least connection with the Hindu family of languages. The Garrows are isolated from all their neighbours in regard to languages, their country is but a small one; whence they come and how they remain in so small a space, are very interesting questions ; and with them as with any others on this Frontier, the languages are likely to be entirely lost before any philologists arise to determine whence they spring. Captain Jenkins concludes his communication with some account of the Rajahs of Cachar.

Read a Letter from D. F. McLeod, Esq. of Jubbulpore, of 31st March 1841, also requesting to be supplied with Lt. Tickell's papers on the 'Ho' language. 'Not,' writes Mr. Macleod, 'from mere curiosity, but because being closely connected with Hill Tribes and greatly interested in them, I would anxiously seize upon any means of instituting a comparison between the language of our Gonds and the Hill people of other parts, and facilitating to myself or others, an insight into the rudiments of their still unknown tongue. And being not without hope of hereafter seeing one day a mission established amongst these people, I should wish much to have by me for distribution one or more copies of a brochure so admirably calculated to elicit a further enquiry.'

'With reference to his (Lt. Tickell's) most admirable paper on Ho-dês, I would mention as it may be of use, that Kôls still abound in Rewah, in our Lohâgpur mahals, and are even found at Jubbulpore and Seoni. Hence I should be disposed to presume that the term 'Kôl' was introduced by the invaders from Ruhitas, which, as far as I can call to mind, not having his paper with me, was not Tickell's impression on the subject.'

With reference to the two foregoing Letters, it was moved by Dr. Hœberlin, that they contained matters worthy of interesting enquiry and that some one of the Members composing the Committee of Papers should be requested to prosecute the enquiry to elicit information on the points alluded to by Capt. Jenkins and Mr. Macleod.

Resolved that Dr. Hœberlin's services be requested in aid of undertaking the task of prosecuting such enquiry in conjunction with Baboo Prosonocoomar Tagore.

Read a Letter from Major Burlton of the 14th April, 1841, with a collection of Bactrian Coins as a loan for the Society's museum. Major Burlton further offered the duplicates of this collection to the Society, for which courtesy as well as for his kindness in allowing the collection to be laid before the meeting, the Secretary was directed to address that officer with the expression of the thanks of the Society. The coins consisted of some silver Menanders (drach.) in excellent preservation, one of the rude silver coins usually believed to be of Euthydemus *struck at a provincial mint*, and the rest copper coins chiefly Azes and Kadphises. The barbarous provincial type of silver coin is ascertained to be of the time of Euthydemus, (authority—Lieutenant Cunningham) and is found in, or at any rate comes from, the Bokhara country.

Read a Letter and enclosure from Dr. H. H. Spry of the 5th May, 1841, of which the following is a copy.

MY DEAR TORRENS,—I have been honored by Dr. Wm. Edwards, whose celebrity as the author of more than one important Physiological work must be well known to you, with a communication relative to the establishment of a '*Société Ethnologique*' at Paris, of which I feel proud in having an opportunity of submitting an outline to the notice of the Asiatic Society of Bengal.

My distinguished friend desires to call my attention to a subject which he says he has close at his heart. He has reminded me of the fact, that he has established at Paris an Ethnological Society. It is composed of distinguished and able members, and is going on remarkably well. He then goes on to say, that his wish is to have some of the most eminent scientific men an Calcutta named as members of the Society. He desires that the names may be limited to four or five.

Directions for travellers have been drawn up and published comprising every point in Ethnology. A few copies have been forwarded and I now do myself the pleasure of placing a couple at the disposal of the Society.

Dr. Edwards alludes to three things that he is solicitous about. The possession of drawings, principally outlines, with very little shade, of the best characterized heads of the Indian races; men and women. If by any possibility casts could be taken, another great benefit would be conferred, and lastly, skulls, which Dr. Edwards hopes may without great difficulty be collected. If cases die in hospital, and opportunities occur for possessing the skull, he wishes much that a drawing of the Indian front, of the natural size, should be made in order to arrive at an accurate knowledge of the relation which existed between the skull and the features.

Dr. Edwards asks as a favor if he could be put in possession of any drawings of Indian races;—for them, he says, the Ethnological Society of Paris would feel deeply grateful.

I send you these outlines, with the hope, that by giving publicity to the objects and intentions of the Ethnological Society at Paris, through so scientific a body as the Asiatic Society, assistance may be rendered the physiologists of Paris in the pursuit in which they are engaged

You will see the particulars more in detail in the two accompanying brochures of general Instructions, which perhaps you will oblige me by laying before the Meeting of the Society to-night.

Société Ethnologique.

INSTRUCTION GÉNÉRALE ADRESSÉE AUX VOYAGEURS, ETC.

§ I.

DES CARACTÈRES PHYSIQUES.

Le point le plus important de l'éthnologie, c'est la connaissance du *type* : on ne saurait en avoir une idée suffisante sans le dessin.

1^o Il faut donc dessiner les portraits de ceux que l'on veut faire connaître ; et avoir soin, pour en donner une idée complète, de représenter la tête de deux manières : de face et de profil.

2^o Il convient aussi de faire une esquisse de tout le corps, et d'en bien étudier les proportions, pour savoir si elles ne présentent pas quelques particularités. Il faut surtout faire attention à la longueur du buste relativement aux membres supérieurs et inférieurs ; au creux des reins et à la saillie de la partie sous-jacente, comme dans le Nègre, le Hottentot, etc.

3^o Il serait bon de prendre la mesure de la hauteur du corps, et d'évaluer sa force au dynamomètre d'une manière approximative, si l'on n'a pas cet instrument.

Il est extrêmement important d'avoir le portrait de l'homme et de la femme, car leurs types tendent à différer d'autant plus qu'on s'élève d'avantage dans l'échelle des races.

4^o Toutes les fois qu'on pourra se procurer les crânes des naturels du pays, on n'en laissera pas échapper l'occasion, et on cherchera de même à obtenir des naturels qu'ils se laissent mouler leur buste.

Il y a toujours chez une nation plusieurs races ; il faut donc chercher à distinguer les types purs du produit des mélanges.

§ II.

DE LA LINGUISTIQUE.

Le point le plus important après, les caractères physiques, c'est la langue. Il est évident que si l'idiôme est cultivé, il y aura des grammaires et des dictionnaires, qu'il sera indispensable de se procurer, s'ils sont rares en Europe. Si ces ouvrages n'existent pas, il faudra y suppléer en formant deux vocabulaires ; l'un bref, l'autre plus étendu, selon le temps dont on pourra disposer. L'un contiendra les noms des objets sensibles, des idées abstraites mais usuelles ; l'autre les différentes parties du discours.

En second lieu, il conviendrait de faire une ébauche de grammaire ; de

s'occuper d'abord du verbe, en prenant les trois temps fondamentaux, le présent, le passé et le futur, avec les modifications des personnes et du nombre ; puis du substantif, avec les variations du cas et du nombre ; de faire connaître l'accord de l'adjectif avec le substantif ; les pronoms, les propositions avec un ou plusieurs régimes, et les adverbes joints à un verbe. Si l'on pouvait indiquer les rapports de la langue avec d'autres idiômes qui lui sont affiliés, ce serait un renseignement fort utile. Quel est le mode de numération en usage ?

§ III.

DE LA VIE INDIVIDUELLE ET DE FAMILLE.

Pour donner une idée des mœurs relatives à l'individu et à la famille, il convient de prendre l'homme à sa naissance et de le suivre jusqu'à la mort, en faisant connaître les actes solennels qui s'y rapportent. Ainsi, quant à la naissance, il y a peu de nations qui n'en marquent l'époque par quelque cérémonie ; il faudrait la faire connaître ; indiquer le lieu où l'on dépose l'enfant ; décrire la manière de le porter, de le vêtir, de le nourrir, de lui apprendre à marcher et à parler. Si l'on exerçait quelque compression sur la tête ou quelque autre partie du corps, il serait bon d'en faire mention,

Quand l'enfant sait marcher ou parler, quelle est son éducation domestique ; car il n'y a pas de peuple qui n'apprenne aux enfans ce qu'ils doivent savoir dans la suite.

Lorsque l'individu de l'un ou de l'autre sexe est arrivé à la puberté, y a-t-il quelque cérémonie qui le constate, et quelles sont ses occupations jusqu'à ce qu'il se marie ? Informez-vous avec soin de ce qui vous avec soin de ce qui concerne le choix d'une femme ; à quelles conditions on l'accorde, et décrivez les cérémonies du mariage. Si dans cette union il y a pluralité de femmes ou d'hommes, comment vivent-ils entre eux ? Quelles sont leurs intrigues pour favoriser leurs fils ou leurs filles, et quelle en est la conséquence pour le sort de ces derniers ? Quelle est l'autorité du père ou de la mère ? Quel est le degré de respect filial des enfans et quels sont en général les sentimens de famille ?

Faites connaître le régime alimentaire des différens membres de la société, suivant leur sexe et leur âge en indiquant : 1^o les alimens ; 2^o la manière de les préparer ; 3^o les personnes qui les apprennent.

Quels sont les vêtemens du peuple, suivant la fortune, le rang, le sexe et l'âge de chaque individu ?

Etudiez les maladies auxquelles les deux sexes sont sujets aux diverses époques de la vie ; et les différences qui ont lieu à cet égard entre les natu-

rels du pays et les étrangers ; les rapports de ces maladies avec le climat et la manière de vivre ; les soins que les parens, les amis et les médecins donnent aux malades.

Quel est le genre d' occupation de l'homme et de la femme ? Quel est leur âge moyen, et le terme extrême auquel ils arrivent ?

Quelles sont les cérémonies qui accompagnent ou qui suivent la mort, telles l' enterrement, le deuil, ect.

Ces cérémonies différent-elles pour le mari et la femme ? Quel est le sort du survivant et des enfans ?

§ IV.

DE LA VIE SOCIALE

Comme les arts ne se développent guère que par des causes sociales, nous devons les examiner ici.

1^o *Habitations, édifices, voies publiques, etc.*

Le moyen le plus sûr et le plus court de donner une idée exacte d'une habitation, c'est d'en faire le dessin ; en marquant par écrit les matériaux dont on sert. Il en est de même de tout édifice, ainsi que des meubles ou des ornemens.

Il convient de faire connaître les différentes manières d'orienter les maisons et les édifices, de les grouper pour former les villages, les bourgs, les villes, ainsi que la manière de les fortifier et de les distribuer dans le pays. Dites si les rues sont pavées ou non et comment on fait les chemins.

Faites connaître tous les autres genres de constructions, tels que les vaisseaux et les bateaux, les ports et les chantiers, les arsenaux, etc. Donnez une idée convenable des canaux, des jardins publics, ect.

2^o *Agriculture.*

Enumérez les plantes qui servent à l'alimentation, telles que les légumes, les grains as fruits ; puis à la médecine, à l'habillement, à la teinture et aux autres arts. Décrivez la manière de les cultiver, en faisant une attention particulière aux amendemens (ou substances minérales qu'on ajoute au sol), aux engrais (ou substances organiques qu'on y mêle) aux moyens de travailler la terre avec les instrumens aratoires, aux procédés d'irrigation. Dessinez les diverses races d'animaux domestiques, donnez leurs caractères distinctifs et l'usage qu'on en fait.

3^o *Tissage, fabrication de vêtemens, etc.*

Faites connaître la manière de parer les différens tissus écus ou les pelletteries servant à l'ère de fore, habillement et aux autres usages domestiques.

4^o *Teinture.*

Donnez une idée suffisante de la manière de préparer les couleurs et de les appliquer.

5^o *Art de travailler le bois et les métaux.*

Marquez le degré auquel les naturels sont arrivés dans ces arts. Indiquez les autres métiers exercés dans le pays.

6^o *Professions. Arts libéraux.*

Distinguez les diverses classes de marchands et de négocians, les hommes de loi et les médecins, ainsi que leur genre d'études et leur manière d'epercer leur profession.

Y a-t-il des peintres, des sculpteurs, des architectes, des ingénieurs, des poètes, des orateurs et des savans ?

Notez le point auquel sont parvenus les arts et les sciences. Rapportez, autant que possible, quelques productions qui puissent nous donner une idée de la manière dont ils sont cultivés.

7^o *Education publique.*

Il serait très utile d'énumérer les diverses espèces d'écoles publiques, le nombre de ceux qui les fréquentent comparé à celui de la population en âge de les suivre ; décrire le genre de leurs études, et de faire connaître les facilités ou les obstacles que rencontrent les élèves lorsqu'ils arrivent à l'exercice de leur profession.

8^o *Etablissemens de bienfaisance.*

Décrivez tous les établissemens de ce genre : hôpitaux, hospices, maisons de prêts, institutions pour les aveugles, sourds-muets, etc.

Indiquez les bibliques et le genre d'ouvrages qui publiquess'y trouvent, tels que manuscrits, livres, gravures, cartes, etc.

9^o *Droit public et privé.*

Un objet d'une haute importance serait d'étudier la constitution de l'état, la hiérarchie des pouvoirs, les droits respectifs des gouvernans et des gouvernés ; de faire ressortir les divers rangs de la société ; et de nous apprendre s'il y a des propriétés communes ou particulières, leur degré de sécurité, et leur mode de transmission par héritage, par vente, par donation, etc.

Comment règle-t-on les discussions qui s'élèvent à leur égard ?

Punit-on les attentats contre les personnes et contre les propriétés ?

Quels sont les crimes et les délits dont on s'occupe, les tribunaux qui en prennent connaissance, et dans quelle proportion se trouvent les criminels et les délinquans par rapport à la population.

Comment asseoit-on et lève-t-on les contributions ? Quel est le rapport entre l'impôt et la perception ?

10° *Relations sociales.*

Les rapports de la société méritent une attention particulière. Il serait bon de connaître les relations qui subsistent entre les naturels du pays et de constater s'il y a de la douceur ou de la dureté, de la probité ou de la mauvaise foi, de la sécurité ou du danger dans les liaisons.

Les sociétés des hommes et des femmes sont-elles séparées ou mêlées ?

Les sociétés des hommes et des femmes sont-elles séparées ou mêlées ?

De quelle manière reçoit-on les visites ; et qu'offre-t-on en pareil cas ?

Donne-t-on souvent des repas ; et qui les compose ?

Quels sont les amusemens publics, les différentes espèces de chasse et de pêche ? Comment les naturels voyagent-ils dans leurs pays, et se déplacent-ils souvent ?

Il sera bon de constater la facilité ou la difficulté que l'on rencontre à gagner sa vie, le nombre ou la proportion des indigènes ; la population respective des deux sexes, etc. ; le rapport de la mortalité aux naissances. S'il n'y a pas de documens statistiques directs, il faudrait donner les meilleures preuves de l'augmentation, de la diminution ou de l'état stationnaire de la population ; le nombre des mariés, des célibataires, des enfans légitimes et naturels, etc.

§ V.

DES RAPPORTS DES NATURELS AVEC LES PEUPLES ETRANGERS.

1° *Institutions militaires.*

Dessinez les armes, si elles ont quelque chose de particulier.

Faites connaître la manière dont on lève les armées ; et dites si elles sont permanentes ou non.

Quels en sont les grades, les exercices, la discipline ?

Quelles sont en général les causes de guerre ?

Faites savoir s'il y a une quelconque cérémonie par laquelle on la déclare, ou si on la fait à l'improviste ?

Quel est le genre de stratégie et de tactique suivi ?

Quels sont les rapports entre la cavalerie et l'infanterie, ou enfin entre les différentes armes ? Il faudrait dire encore s'il y a un droit des gens relatif à la guerre et au maintien de la paix ; comment on règle les alliances offensives et défensives ; comment on traite les ennemis pris à la guerre ; si on les massacre, ou s'ils sont prisonniers ou esclaves ; et dans ces deux cas, quel est leur sort pendant qu'on les conduit au marché et quelle est leur destinée dans la suite.

2° *Commerce.*

Donnez un tableau aussi complet que possible des denrées que le pays fournit aux indigènes et aux peuples étrangers, et de celles qu'il en reçoit. Faites connaître les moyens de transport et les échanges soit en monnaie, soit en nature. Quels sont les établissemens qui peuvent faciliter le commerce, tels que bourse, banque, etc. Dites le nombre d'étrangers qui pénétreraient dans le pays, et la manière dont ils y sont traités et comment ils en peuvent sortir ?

Quels sont les pays étrangers que les naturels visitent et les moyens de communication ?

§ VI.

DE LA RELIGION.

Quelle est l'idée que les habitants du pays se forment de Dieu et des êtres qu'ils regardent comme supérieurs à l'humanité ?

Dites ce qu'ils pensent d'une vie future, de la distribution des peines et des récompenses.

Cherchez à connaître les autres dogmes religieux.

Quelles sont les formes du culte, les différentes pratiques et cérémonies religieuses ?

Jusqu'à quel point le peuple croit-il aux dogmes ; et comment pratique-t-il les devoirs prescrits ?

Entrez dans quelques détails sur la hiérarchie, les droits et l'influence du clergé ou de ceux qui représentent les prêtres ; et faites connaître l'action morale de la religion sur le peuple.

Décrivez les superstitions et la manière dont elles agissent sur les sociétés.

§ VII.

DES RAPPORTS DU PEUPLE AVEC LES CONDITIONS EXTERIEURES.

1° *Sol.*

La terre est-elle plane ou montueuse ? Quelles sont les rivières, les lacs, les marais, les marécages ; et quelle est la nature géologique du terrain ? L'eau est-elle contenue dans le lit des fleuves, ou déborde-t-elle ? Y a-t-il de l'eau et des terres salées ? Dans quelle étendue se trouve la partie boisée ?

Indiquez-nous le degré de fertilité de la terre ; et dans quelle proportion se trouvent les parties productives avec les parties stériles. Donnez une indication des objets utiles, nuisibles ou curieux qui peuvent exister dans les règnes organique ou inorganique.

2° *Climat.*

Faites connaître :

1° { 1° La température,
2° La pression barométrique } moyenne { 1° du jour.
3° La quantité de pluie, } et extrême { 2° du mois.
3° du trimestre.
4° de l'année.

2° Les jours { de pluie } par { mois.
d'orage } { trimestre.
année.

3° L'intensité de lumière solaire comparée à la lumière diffuse (à l'ombre); succession et variation des saisons.

§ VIII.

DES TRADITIONS HISTORIQUES, REVOLUTIONS POLITIQUES ET ANTIQUITIES.

Il faudra rechercher d'abord quels sont chez un peuple les souvenirs qu'il a conservés de son origine et de ses affinités avec d'autres peuples; quelles sont les révolutions qu'il a éprouvées dans sa langue ou dans ses mœurs, dans les arts et dans les sciences, dans sa richesse, sa puissance ou son gouvernement, par des causes internes ou des invasions étrangères.

Quelles sont les sources où l'on peut puiser les instructions demandées?

Sont-ce des documens historiques ou des monumens de l'arts? Dans le premier cas, ces documens sont-ils consignés dans des poèmes ou dans des ouvrages purement historiques? Il serait fort heureux de pouvoir en donner une idée.

Dans le second cas, il sera nécessaire de donner un dessin et une description pour les parties qui l'exigent, des édifices monnaies dont on peut tirer quelque fruit pour la solution des questions proposées.

Cherchez dans les traditions mythologiques tout ce qui se rapporte à l'histoire du pays.

Quelles sont les opinions des naturels sur la cosmogonie; quel est leur système de chronologie; et jusqu'à quelle époque remonte-t-elle?

N.B.—The Secretary begs to recommend the above 'Instructions' to the attention of members of the Society, whose position throws them into communications with any of the tribes and races in Central India, or on the frontiers whose distinctive characteristics are so strongly pronounced, as is generally the case with those semi-barbarous people. The consideration of these subjects with reference to the several attributes as noted by Dr. Edwards, would form a highly interesting and useful study. The Secretary has been fortunate enough to recover among some papers, recently sent to the Society's rooms, an essay on the principles of Ethnology by Dr. Woods, a corresponding member of the Parisian Ethnological

Society. This is placed at the disposal of the Editor of the Journal of the Asiatic Society, for early publication.

With reference to the request of Dr. Edwards of Paris, 'for Heads of the Indian races' to serve as aid to his studies in Ethnology, the Secretary suggested a collection of Grant's 'Heads,' should be forwarded, but Dr. Spry had already anticipated him, and it was resolved to refer the Letter to Professor O'Shaughnessy to ascertain if 'Casts' were not available from the native modeller in his employ.

The Secretary informed the meeting that a 'Circular,' by desire of the Governor General, has been issued by Dr. Pearson, for contributions of subjects of Natural History for enriching the Barrackpore Menagerie, the Zoological Society and the East India Company's Museum.

The Secretary noticed that a Sanscrit work was laid by Baboo Sooruj Narain Roy before the Society. It was resolved that it be referred to Dr. Hæberlin for examination, and report of the merits of the publication in question.

For the presentations and contributions, the thanks of the Society were accorded.

NOTE.—I received too late for No. 110 the following Addenda to the paper on Arracan, by Dr. SPRY, which was published in my last.

“Since I sent you this I have heard from Captain
“Lumsden that his labours in sinking two shafts for
“Coal (Arracan) were arrested at the depth of 19 and
“16 feet respectively, by the influx of water; and that
“there was reason to believe that at the time the ope-
“rations were stopped the stratum had very nearly been
“pierced. It also appears that I was mistaken in be-
“lieving that adequate funds are not placed at the dis-
“posal of the authorities for prosecuting Coal disco-
“very.”



JOURNAL

OF THE

ASIATIC SOCIETY.

Of the early History of Sindh, from the "Chuch Namuh" and other authorities. By LIEUT. POSTANS, Assist. Pol. Agent, Shikarpore.

[My able correspondent, Lieut. Postans, has been for some time perseveringly employed in tracing out whatever material is available in *Sindh*, for the purpose of throwing light upon its early history. A book called the "*Chuch Namuh*," is the principal authority to which he has had recourse in preparing the historical sketch, which he has enabled me to have the satisfaction of publishing. Both he and Capt. Hart (2d Grenadiers, Bombay army) who has been turning his attention to similar pursuits, despair of discovering any more authentic work bearing upon the early history of *Sindh*, and agree in describing the modern *Sindhees* as so illiterate and apathetic, as neither to have the will, nor the power to further their researches. I still, however, do not despair of the recovery of other authorities, as the country becomes better known to us.

In the mean time, Lieut. Postans has ably and successfully availed himself of all the material at his disposal, which, dating from the Mussulman inroads, may be fairly considered as authentic. The short notice of the history of *Sindh* before that period, to be found in the works of Mussulman authors, must be necessarily in many respects of a traditional character, and we indeed find, that the *Chuch Namuh* does not attempt to do more than describe the revolution which destroyed the ancient Sindian dynasty in the century immediately preceding the Islamite invasion. The use of the modern Persian name *Bruhmanabad*, as applied to a city in the days of *Chuch*, gives sufficient proof of the loose manner in which the Mussulman historian collected his material; he was perhaps, in the spirit of a genuine Moslem, careless of all respecting the infidel inhabitants of the land, which was not in some way immediately connected with the advent of his own people.

We are not the less bound to acknowledge our obligations to Lieut. Postans, for having undertaken the task of laying, compendiously, before an English reader, the first historical notice of *Sindh*, which has I believe appeared unconnected with the history of other lands and peoples.]



CHAPTER I.

Sindh—its situation—climate—name whence derived—early history—capital *Alor*—extent of territory—rule of the *Rahees*—appearance of the first Brahmin *Chuch*—his reign and death—his son *Dahir*—account of his rule until the Mahomedan invasion.

Sindh is one of the sixty-one climates of the world; it is situated in the five first climates, belonging chiefly to the second, and is in the same region as the holy cities of *Mecca* and *Medina*. The river of *Sindh* rises in the mountains of *Cashmeer*; another joins it from the mountains of *Cabool* in *Mooltan*; it is met by the river *Sehoon*, and thus proceeds to the sea. Its water is clear, bright, and cool during the hot season; in the language of the country, it is called *Mehran*. All the rivers of *Sindh* flow towards the south, where they empty themselves into the sea, (such as the waters of *Peelab*, *Chenab*, *Lahore*, *Sultanpoor*, and *Bajuwarrah*.) The climate

Climate. of *Sindh* is delightful; its mornings and evenings cool, the country to the north hot, whilst that to the south is cold. Its inhabitants intelligent, and of large stature. *Sindh* is so called from Name whence de- *Sindh*, the brother of *Hind*, the son of *Noah*, whose rived. descendants from one generation to another ruled in that country; from them also sprang numerous tribes, such as the *Nubeteh*, the men of *Tak*, and the tribe of *Moomeed*, who governed Early History. and possessed it by turns; no record remains of these, and its history commences with the last of the dynasty of the *Rāhees*, or *Rajahs*, whose capital city and seat of government was *Alor*.

Capital *Alor*. *Alor* is described as a large, flourishing, and populous city, situated on the banks of the river *Mehran*, possessing large edifices; its gardens highly cultivated, producing every kind of tree and fruit, where travellers had all their wants supplied.

This territory extended to the east as far as *Cashmeer* and *Kunooj*; Extent of Ter- west to *Mukran* and the sea; south to the territories ritory. of the ports of *Surat* and *Deo*; and to the north to


Kandahar, *Seestan*, and the mountains of *Soolleemany*, *Girwān*, and *Rynahan*. The first *Rahee* mentioned, is *Rahee Dewahey*; he was a powerful prince, possessing absolute authority over the territory of *Sindh*, as above-mentioned, and formed alliances with many of the rulers in *Hind*; at his death, he was succeeded by his son *Rahee Siheersin*; he by his son *Rahee Sahursee*; and he by his son *Rahee Siheersin* the 2nd. During this reign, the king of Persia, *Ueem Roz*, sent a force by the road of *Kirman* to *Mukran* and *Reech*, which countries they laid waste, and *Rahee Siheersin*, in trying to repel this invasion, was defeated, and he himself killed by an arrow through the neck; his troops fled to *Alor*, and his son *Rahee Sahee* was seated upon the throne. During the *Rahee Sahee's* reign, the Brahmin *Chuch*, (who afterwards possessed the country, and bequeathed it to his son,) made his appearance. It is related, that *Rahee Sahee's* minister *Ram Rao*, was a man of such capability, and so well directed the affairs of state, that the *Rahee* himself seldom interfered with them, but passed the greatest part of his time in the sensual enjoyments of his harem. Accident brought *Ram Rao* and the Brahmin *Chuch* together; the latter is described as having been a very talented and eloquent man, well versed in all the learning of the Hindoos. *Ram Rao* appreciating his abilities made him his deputy, and on one occasion sent him on some affairs, which required the *Rahee's* attention, to the door of the harem: the sanctity of *Chuch's* priestly office admitted of his being allowed to enter the private apartments without the formality of a curtain between him and its inmates, and so great was his personal beauty, that the *Ranee* became enamoured of him at first sight; she afterwards made *Chuch* acquainted with her passion, but he declined her overtures, on the score of his being a Brahmin, and as such, incapable of treachery to the *Rahee*, whose confidence he had gained. But an opportunity soon presented itself to the *Ranee* for the accomplishment of her designs. The talents of *Chuch* had given him almost universal sway over the affairs of government, and the minister *Ram Rao* was no longer thought of; in the mean time the *Rahee* became dangerously ill, and the *Ranee* formed a plot, by which, in the event of the *Rahee's* death, *Chuch* should succeed to the throne of *Sindh*. She caused a proclama-

tion to be issued in the name of the *Rahee*, for a general assembly of all ranks and classes, and placed the throne in the public hall of audience. When the people were assembled, they were informed that the *Rahee's* health prevented his then being present, or any longer attending to the affairs of his country, but that he had given his signet, and delegated absolute authority to the Brahmin *Chuch*, whom they were to obey as his deputy. *Chuch* was thus vested with power, and his ability secured him the obedience of the subjects; the *Rahee* afterwards died, leaving no children; *Chuch* married the *Ranee*, and by universal consent was placed upon the throne. The government of five preceding *Rahees* occupied 137 years. *Chuch* was the first Brahmin who ruled. Many of the relations of the deceased *Rahee*, who until his death, possessed claims to the government of the country, were inveigled by the *Ranee* into the palace, and murdered. *Chuch* opened the doors of his treasury, and by his bounty secured the good offices of the soldiers, and of his subjects generally. He had scarcely however imagined himself secure on the throne, when *Rana Mihrut Chittooree*, heading the remainder of the relations of *Rahee Sahee*, came with an army from Joudpoor and Chittoor to assert their claims to the throne. The *Ranee* urged *Chuch* to prepare to defend his possessions; he again propitiated the troops by large presents in money, and prepared to meet *Rana Mihrut*. The forces drew up for battle, in the vicinity of *Alor*, but *Rana Mihrut* advancing in front of his host, challenged *Chuch* to single combat, as the most merciful way of settling a dispute, in which the two chiefs only were immediately concerned. The result of the combat was decided to be final as to all claims of territory; and whoever fell, his country was to pass to the possession of the victor. *Chuch* consented to this; the two chiefs advanced in front of their armies; *Chuch* directing his servant to bring his horse slowly after him, mounted quickly, and treacherously slew *Rana Mihrut* with one blow of his sword. The troops of the latter witnessing the fall of their leader, fled in dismay; *Chuch* pursued and killed many of the fugitives; he then returned with great pomp to *Alor*, the houses and bazars of which city were ornamented upon the occasion. His authority was now established, and he became a powerful king. After a reign of 40 years he died, leaving two sons; the eldest *Dahir*, and the younger *Dihir*; he had also one daughter. His eldest

son *Dahir* succeeded to the throne, and his brother *Dahir* was appointed governor of *Burhamanabad*. He made a tour of his dominions, and after a treaty of peace with the governor of *Kirman*, returned to *Alor*. When he had for some time occupied himself in adjusting and arranging the affairs of his country, he consulted the astrologers as to his future fate, and that of his dominions; they told him that neither in his own, nor in his brother's horoscopes could they discover any evil sign, but that in his sister's it was written, that whomsoever she married, should possess the country of *Sindh*; this sorely perplexed *Dahir*, who finding the thought of his losing power and empire too intolerable to bear, determined to confound the fates, and avert the evil threatened, by marrying his own sister; his subjects and those about him tried in vain to dissuade him from so unnatural a proceeding, but his superstition was insurmountable, and with all the forms of his religion he married her.*

When his brother *Dahir* heard this, he was sorely incensed, and wrote a letter full of bitter reproaches to *Dahir*, for the disgrace which he had brought upon his family, adjuring him to make all the reparation in his power, by breaking off so unholy an alliance.

Dahir's infatuation would not admit of this, and he excused himself by assuring his brother, that beyond the mere ceremonies of marriage he had committed no sin.† *Dahir* determined to punish his brother, and with this intent collected a large force at *Burhamanabad*, with which he marched upon *Alor*, and encamped under the walls of the city; through the intervention of the mother, peace was concluded between the brothers, and *Dahir* died shortly afterwards of small pox, in the city of *Alor*. *Dahir* proceeded to *Burhamanabad*, and having appointed another deputy to govern it returned to *Alor*, where he busied himself in completing the fortifications, which his father *Chuch* had begun. His

* Capt. Hart in a letter to me quoted, in No. 108 (p. 1216 of vol. ix. Asiatic Society's Jour.) mentions the remains of an ancient city in *Upper Sindh*, called by the country people "Dumb-i-Dilora-Shah," traditionally said to have been destroyed on account of the king having married his sister. He referred me then to the "*Chuch Namuh*." The tradition refers doubtless to the "*Alor*," of the history, making it however the name of the king instead of the city, and to the story of *Dahir*. 

† It is but just to add, that in all the manuscripts from which this sketch is compiled, *Dahir* is particularly represented as not having added the crime of incest to his other follies.

dominions were prosperous, and his sovereignty firmly established ; he made a tour to the East as far as *Cashmeer*, upon the boundaries of which country he planted two trees as memorials of his journey. The flourishing state of the country, and the growing power of *Dahir*, excited the envy of the *Rajahs* of *Hind*, and they instigated and supported *Runmul*, governor of *Kunooj*, in collecting a large force to descend upon *Sindh*. *Runmul* marched to the neighbourhood of *Alor* ; *Dahir* called in the assistance of Arab mercenaries, and sought advice as to the best method of repelling the invasion, from *Mahamed Ullafee*, who directed him to dig a ditch in front of his army, one furlong in length, and to cover it over with grass, &c. *Mahomed Ullafee* at the head of about 5000 men, Arabs and Sindians, made a night attack upon the enemy's camp, then feigning a retreat, led them to the ditch, into which they fell, and were for the greatest part slaughtered ; he took many prisoners, (80,000 men and 50 elephants.) After this victory the power of *Dahir* was more than ever firmly established ; he ruled with pride and prosperity for twenty-five years, when his kingdom began to decline.

CHAPTER II.

Reason of sending the army of the Faithful to *Sindh*—*Buzeel* killed—*Bin Cassim* appointed to command the army—arrives at *Deebul*—takes that place as well as *Nierunkote*—the governor of *Moostan* surrenders—*Hijaj Bin Sookufie* urges *Bin Cassim* to attack *Alor*—the tribe of *Chunch* proffers their allegiance—the fort of *Rawur* taken.

The king of Ceylon, *Serundeep*, sent some servants to the *Khalif* of *Bagdad*, (*Abdool Mulk*,) with presents of female slaves, and other merchandize ; the boat which conveyed them, was driven into the port of *Deebul*, (now called *Tattah* and *Lahuny*,) where they were attacked and robbed by a predatory tribe, (the *Nukamreh*s,) some were killed, the rest imprisoned. When the news of this outrage reached *Hijaj Bin Yusuf Sookufie*, minister of *Abdool Mulk*, he instigated that prince to send an army to *Sindh*, to retaliate upon the infidels, and to release the faithful ; at the same time he wrote a letter to the *Rajah Dahir*, for some explanation of the circumstances. *Dahir* disclaimed any participation in the affair,

or any authority over the robbers who had committed it. *Hijaj* gained the *Khalif's* permission to send an officer named *Buzeel* to *Mukran*, where he was instructed to levy troops, and attack *Sindh*. *Dahir* killed him, and sent his son *Jaiseh*, who defeated *Buzeel's* forces, killed him, and took many prisoners. In the mean time the *Khalif*

H. 92 A. D. 710. died, and was succeeded by his son *Wulleed*, (*Bin Abdoul Mulk*); *Hijaj* urged him to renew the war, and to send a force under *Mahomed Bin Cassim*, (a cousin of *Hijaj*), to release the faithful, and punish the unbelievers, as his father, the former *Khalif*, had intended to have done. The *Khalif Wulleed* gave the necessary orders to *Hijaj* for the preparation

and equipment of a force from the public treasury. In one month he collected an army of 15,000 men, 6,000 of whom were horse, 6000 mounted on camels, and 3,000 foot, with 30,000 dinars for expenses; five catapultas for levelling forts were dispatched in boats. *Bin Cassim*

Arrives at *Deebul*. marched, and arrived at the fort of *Deehul*, to conquer *Sindh*, in the year 92 H. (A. D. 710.) *Jaiseh*, the son of *Dahir*, was at that time governor of the fort of *Nierunkote*,* and sent intelligence of the arrival of the Mahomedan army to his father at *Alor*; *Dahir* asked advice of the *Ullafees*, (a tribe which he had sheltered after an outrage which they had committed on some of the deputies of *Hijaj*); they counselled him to avoid meeting the powerful army of *Bin Cas-*

Takes *Deebul*. sim, and to entrench himself in the fort of *Alor*. *Bin Cassim* took the fort of *Deebul*, in which was a large Hindoo temple, so sacred,† that it was supposed to act as a talisman, and to prevent the capture of the fort. *Bin Cassim* threw it down with a catapulta, destroyed the temples of the idolaters, building *musjeeds* on their sites, released the prisoners of the Faithful who were confined there, and putting his material on board boats, proceeded to *Nierunkote*. After a difficult journey of seven days, the roads being blockaded by the *Sindians*, and the troops of *Bin Cassim's* army suffering much from drought, owing to the river not swelling,‡ the army of the Faithful arrived before the fort of *Nierunkote*, the governor of which was *Sumnee*, who had succeeded the son of *Dahir* (*Jaiseh*), in consequence of the

* Near the modern city of *Hyderabad*, see Capt. McMurdo's paper on *Sindh*.

† Hence its name from the Hindoo, for a temple, *Deebul* or *Deewul*.

‡ The Mahomedan army joined in prayer for relief from this calamity; their supplications were answered by a plentiful fall of rain and a swell of the river.

latter being sent to the more important command of *Burhamanabad*. The Mahomedans began to suffer much from want of supplies, but

after a short siege, the governor *Sumnee* surrendered the keys of the fort on condition of quarter to the garrison. *Bin Cassim* entered the fort, destroyed the temples, built *musjeeds* and *minarets* in their stead, and appointed keepers and *mouzzins* to the same; he left magistrates to preserve his authority at *Neirunkote*, and taking the governor *Sumnee* with him, proceeded onwards. This last wrote to the governor of the fort of *Moostan*, *Bucherim Chunder*, advising him to submit to the invaders, as they were too powerful to oppose. *Bucherim's* fidelity however was unshaken, but after a week's siege, he was obliged to abandon the

fort, and flee to *Seem*, of which place *Boodeh* was governor. *Bin Cassim* took possession of the fort of *Moostan*, and having made arrangements for its government, proceeded to *Seem*, where he found *Bucherim Chunder* and *Boodeh* prepared to oppose him. The infidels failed in a night attack upon the camp of the Faithful; and *Kakeh*, *Boodeh's* father, foreseeing that the time was arrived when the country of *Sindh* must submit to the Mahomedan arms, came to *Bin Cassim* to intreat for quarter for his son, and the whole garrison of *Seem*—it was granted. *Bin Cassim* took possession of *Seem*, and leaving *Abdool Mulk* to settle the affairs of that place, pursued his march, daily adding fresh conquests to the arms of the Faithful; he took the forts of *Buhultoor*, *Kundabuh*, (? *Gundava*,) and *Mussalohj*, from all of which he exacted tribute, leaving troops to retain the new possessions thus acquired. At this time a

letter reached *Bin Cassim* from *Hijjaj*, ordering him to *Neirunkote*, to cross the river, and prepare to expel the *Rajah Dahir* from the capital of the country *Alor*. The large and powerful tribe of *Chuch* proffered obedience to *Bin Cassim*; it is also related that they embraced *Islamism*, and were the first inhabitants of *Sindh* who did so. In obedience to the instructions of *Hijjaj*, *Bin Cassim* proceeded to the fort of *Rawur*, which he summoned to surrender; the governor *Mokeh Bin Bussayeh* made a feint to resist, being afraid of the wrath of *Dahir*, but ultimately surrendered the fort, and with the garrison promised obedience to *Bin Cassim*.

CHAPTER III.

Dahir alarmed at the successes which attend *Bin Cassim*, exerts himself to prevent his crossing the *Meheran*—the Mahomedans suffer from famine—*Dahir* offers terms—not accepted—*Hijaj* sends horses and supplies to *Bin Cassim*, who passes the river—*Dahir's* consternation—comes out from *Alor* with a large army—account of his death, and the defeat of his forces—the Mahomedans enter the capital *Alor*.

The successes which attended the army of *Bin Cassim*, began to terrify the *Rajah Dahir* for the safety of his capital and dominions, and he foresaw that if the Mahomedans effected the passage of the river, the fate of his sovereignty was sealed. He collected an army of the *Koordans*, and arriving at the opposite bank, employed himself in obstructing the passage of *Bin Cassim*; this duty he afterwards delegated to *Jah Humeen*, and he himself returned to *Alor*. *Jah Humeen* performed his part so well, aided by the *Rajah's* son, *Jaisch*, (who cut off the supplies of the Mahomedans,) that these latter began to suffer all the misery and horrors of a famine; they were driven to slay their own horses for food; coupled with this, *Chund Ram Haleh*, the former governor of *Secoostan*, heading some insurgents, seized that fort from a small party of horse, who were left to govern its garrison. *Bin Cassim*, however, immediately dispatched *Muzhub Bin Abdul* with 1000 horse and 2000 infantry, who regained the fort, and took *Chund Ram* prisoner. *Dahir* thinking these misfortunes would soon dispirit the Moslems, wrote to *Bin Cassim*, assuring him, that if he wished to withdraw his forces, he might do so in security; the latter answered, that he had no intention of retiring, until he had taken the capital *Alor*, and subjected *Sindh* and its dependencies to the Mahomedan rule. The intelligence of the difficulties encountered by *Bin Cassim*, and the loss of the passes, reaching *Hijaj*, he dispatched 1,000 others, with fresh supplies to *Bin Cassim*, urging him to lose no time in crossing the river, as the overthrow of *Dahir* was the first and most important step; on receiving this, *Bin Cassim* proceeded to *Juhum*, where with

Dahir alarmed at the successes of *Bin Cassim*.

Opposes the passage of the *Mehran*.

Hijaj finds supplies and horses.

the assistance of *Moheh Bin Bussayeh*, he collected some boats, and filling them with sand and stones, commenced a bridge for the passage of his army; it was under many difficulties and obstructions at length completed; the first detachment of the Faithful passed the river under a shower of arrows from the infidels, who were collected in strength on the opposite bank; but these being driven back, the whole of the army of *Bin Cassim* passed without further molestation. It is reported that *Dahir's* consternation, rage on receiving the intelligence was so great, that he killed the messenger who was the bearer of it.

Bin Cassim now exhorted his soldiers to firmness: "the river was in their rear, and the enemy in front, still if any were faint-hearted amongst them, then was the time to quit the army, and return to their own country." There were only three of the whole host who did so. *Bin Cassim* having thus secured the co-operation of his troops, proceeded onwards to *Jeyoor*, near which place he first caught a glimpse of *Dahir's* forces; he detached *Muhuzzin Bin Sabit Kiessee* with 2,000 men, and *Mahomed Zyad ul Huddee* with 1,000, to oppose them. In the mean time, *Dahir* called *Mahomed Haris Ullafee* to him, and said: "I have protected and promoted you; now is the time to requite my kindness, and to shew yourself worthy of my confidence." *Mahomed Haris* excused himself by saying, that he could not oppose the Moslems without being a renegade to the faith he professed. *Dahir* therefore deputed his son *Jaisch* to lead his army against *Bin Cassim*; he did so, but was defeated with great slaughter, and *Bin Cassim* advanced upon *Alor*, which he besieged.

On the 10th of the month *Ramzan*, in the year ninety-three *Hejira*, *Dahir* comes out from *Rajah Dahir* determined to make one bold stroke *Alor* with a large army. for his crown and kingdom; came out from the city of *Alor* with an immense army; they say he had 30,000 infantry in advance of his cavalry and elephants; he himself seated on an elephant, the *howdah* of which was richly ornamented, passed to the right and left, animating the soldiers, and disposing his battalions in order of battle; seated in the same *howdah* were two beautiful female slaves, one administered wine, the other *pān* and *beetle-nut* to him. The battle which ensued is described as

terrific, lasting from morn till night. *Bin Cassim* himself fought as a common soldier with his troops, performing deeds of valour; but the day was decided in favour of the faithful. In consequence of the latter throwing fireworks amongst the Rajah's elephants the *howdahs* took fire, and the infuriated beasts rushed madly through their own troops, trampling down all before them until they arrived at the river, into the muddy banks of which they plunged. *Dahir's* elephant was amongst them, and the Mahomedans profiting by the confusion, threw

Dahir's death and the defeat of his army. showers of arrows, one of which struck *Dahir* in the neck, and killed him; his elephant sunk into the mud; and the Brahmins who were behind the *howdah*, took the body of the Rajah and buried it there. The infidels fled in all directions, and the carnage which ensued was dreadful; all the approaches to the citadel of *Alor* were most carefully blocked up, and the Brahmins and two female slaves fell into the hands of an officer of *Bin Cassim's* army, named *Keiss*, to whom they detailed the particulars of *Dahir's* death, and begged for quarter. *Keiss* took them to *Bin Cassim*; the body of *Dahir* was found in the mud of the river, and the head was severed from the body, and stuck upon a spear. That night the Moslems occupied themselves in prayers and thanksgivings for the victory they had gained. The next morning *Bin Cassim* caused the head of *Dahir*, together with the two slaves, to be placed over one of the gates of the city. *Dahir's* wife, *Ladee*, seeing this, threw herself from the walls, and the garrison being no longer able to offer any opposition, opened the gates of the fort. The army of the Mahomedans enter *Alor* 93 H. (A.D. 711.) faithful entered and took possession of *Alor* on Friday, the 11th of Ramzan, in the 93rd year of the *Hejira*. *Dahir* ruled 33 years, and the rule of the Brahmins embraces a period of 92 years.

CHAPTER IV.

The tribe of *Soommah* and others pay homage to *Bin Cassim*—the rebellion of the sons of *Dahir*—governors appointed to the principal cities and provinces of *Sindh*—*Bin Cassim* extends his conquest as far east as *Cashmeer*—the story of his death—deputies of the Kings of *Ghuznein*, *Ghoor*, and *Delhi*, govern in some of the provinces of *Sindh*—origin and rule of the tribe of *Soomrah*—*Nasir-ul-deen Kibajeh*—his rule and death.

The whole of the rich booty of *Alor*, including the treasury and crown jewels of *Dahir*, were collected and placed in charge of *Keiss*, to convey to the *Khalif* at *Sham*. The *Khalif* honoured and promoted *Keiss*, and wrote letters of approbation to *Bin Cassim* urging him at the same time to extend his conquest still further, until the whole of the countries which were dependencies of *Sindh*, should be subjugated and form part of the *Khalif's* territories.

After the defeat and death of *Dahir*, the men of *Soommah* came with music and dancing to pay homage to *Bin Cassim*; he asked the reason of this, and they told him that it was their custom thus to greet a victorious chief. The *Lohanas*, *Battis*, men of *Suhateh*, *Koosejeh*, *Haleh*, &c. led on by *Ally Mahomed Bin Abdool Ruhmun Sulleetee*, with head and feet bare, also proffered their allegiance. Rebellion of the sons of *Dahir*.

In the meantime the sons of *Dahir* entrenched themselves in the fort of *Sikunder*, where they determined to offer opposition to *Bin Cassim*. *Burhamanabad* having previously been taken, and its tax and tribute settled, *Bin Cassim* marched to besiege the fort of *Sikunder*, and to quell the rebellion of the sons of *Dahir*, (*Jaisch*, *Toofic*, and *Wukeeah*); he reduced this place, and although the sons of *Dahir* were sometime before they would believe the death of their father, (even abusing their mother, who was sent to assure them of it, by calling her a *hâr*, traitress, and one in league with the "slayers of cows,") a sorceress assured them that he was dead, whereupon they surrendered.

The capital city *Alor*, with all the principal provinces and cities of the country of *Sindh* having thus fallen to the Mahomedan arms, governors were appointed to the following places:

Uhnuf Bin Keiss to *Alor*, with *Moossie Bin Yakoob* as *Cazy*; to *Burhamanabad*, *Widah Bin Ameen*; and to

Rawur, Tobeh Dārus. *Bin Cassim* then proceeded towards *Mooltan*, and on the road, at the fort of *Baheeah, Kulsur Bin Chunder* made obedience to him; after that, the fort of *Sukkeh* was taken, and *Utbeh Bin Tumhee* left there as governor. *Mooltan*, with all its strongholds and dependencies fell to *Bin Cassim*, who appointed *Khuzzaneh Bin Abdool Mulk* to the fort of *Mehpoor, Darwood Bin Nusserpoor* to *Mooltan*, and proceeded to *Debalpoor*; at this time he is reported to have had 50,000 horse and foot under his banners, independent of the regular army with which he invaded the country. Having taken possession

of the countries to the east as far as *Cashmeer* and *Kunnooj*, he returned, having placed trustworthy governors and servants in all those places. At the time

that *Keiss* was deputed to convey the treasure and booty captured at *Alor*, with the prisoners to the *Khalif* of *Sham*, amongst the

latter were two daughters of *Dahir*.* The *Khalif* consigned them to his *harem* until they should recover from the fatigues of travel, and be prepared for his service; their beauty was very great, and the *Khalif* was about to consign one to his bed, when she informed him that *Bin Cassim*, flushed with victory, had robbed them both of their virginity, and had kept them in his *harem* for three days; the *Khalif's* wrath at this knew no bounds, and he wrote an order with his own hand, informing his servants to seize *Bin Cassim*, to sow him up in a raw cow's hide, and send him to *Bagdad*. This order reached the chief at *Hadapoor*, and he desired the servants to obey the order of their tyrannical master; they did so, and in three days the brave *Bin Cassim* sunk under the torture. His body was conveyed to the *Khalif*, who exultingly shewed it to the two women, as a proof of his absolute power; and of the full measure of revenge which he had taken upon the innocent *Bin Cassim*. They confessed that the accusation was totally false; that they were solely actuated by revenge for the murder of their father, and the destruction of his kingdom. The wretched *Khalif* too late saw the injustice he had committed, and suffered the most poignant remorse; he caused the two women to be tied to horses, and dragged to death through the streets of *Bagdad*. *Bin Cassim* was buried at *Damascus*. At the time of *Bin Cassim's* death, *Bin Keiss*

* Gispul Deo and Soeing Deo.

was governor of *Alor*, the other places being governed, as before-mentioned; five other governors, deputies of the *Khalif* *Deputies from the* *Khalifs of Beni Oomhae*, governed *Sindh* successively, with little or no alteration in the state of affairs, until in the year 133 H. the power over that country passed to the *Khalifs* of the dynasty of *Beni Abbas*. The period of the rule of the deputies of the *Khalifs* of *Beni Oomhae* in *Sindh*, embraces a period of 40 years from its conquest in 93 to 133 H. (A. D. 750.)

Sindh continued to be a dependency of the *Khalifs* of the tribe of *Beni Abbas*, who sent many deputies to govern the country. The only circumstance noted as worthy of observation throughout their rule, is, that one of the governors named *Tumun*, who arrived from *Bagdad*, brought with him many Arabs, residents of *Samrah*, who remained in *Sindh*, and in the course of time, produced the powerful tribe called the *Soomrahs*. In the year H. 416 (A. D. 1025,) *Sooltan Mahmood Ghuzney* sent deputies to the country of *Sindh*, thus terminating the sovereignty of the tribe of *Beni Abbas*, after a period of 283 years. The men of *Soomrah* had for a period of nearly 100 years been powerful *zumindars*; but as they continued to pay tax and tribute, they will be hereafter treated of as rulers.

The deputies of the kings of *Ghuzneiny*, *Ghoor*, and *Delhi*, possessed many of the provinces of *Sindh*, and sent governors *Deputies of the* *kings of Ghuznein, Ghoor, and Dehli,* to them from the time of *Sooltan Mahmood Ghuzneiny*, until a man named *Soomrah*, of that tribe, during the reign of *Sooltan Abool Rusheed Ghuznein*, was by the *Soomrahs* placed upon the throne, about 446 H. (1054 A. D.) and ruled independently. According to some writers, this tribe were originally Arabs, from a place called *Samrah*; they became *zumindars* in *Sindh*, of some power, and after the departure of the tribe of *Beni Abbas*, their numbers increased; whilst the deputies of the kings of *Ghuzneiny*, *Ghoor*, and *Dehli* possessed portions of the country, the *Soomrahs* ruled independently.

According to the author of the *Muntukhib-ul-Tuwareek*, *Sooltan Abool Rusheed* being of weak intellect, neglected his dominions, and the men of *Sindh* threw off his allegiance; and in the year 445 H. (1053 A. D.) placed a man of the tribe of *Soomrah*, named *Soomrah*, on the throne. He married the daughter of *Sad*, a *zumindar*, by whom he had *Bahoon-*

kur, who succeeded his father, and died in the year 461 H. (A. D. 1068;) he left a son, *Deodah*, who ruled for 24 years, and died in the year 485 H. (1092 A. D.) After him *Sunkahar* reigned 15 years; *Huneeff* 36 years; *Onmur* 46; *Deodah* II. 14 years; *Pustoo* 33; *Kezreh* 16; *Mahomeed Toor* 15; *Kuhereh* (unknown,) *Deodah* III. 14; *Tahee* 24; *Juneesur* 18; *Bahoonkur* II. 15; *Huffeef* 18; *Deodah* IV. 25; *Oomur Soomrah* 35; *Bahoonkur* III. 10; *Humeel* succeeded him; and being a tyrant and oppressor, was the cause of the downfall of the *Soomrah* dynasty. But according to others, this tribe was in *Sindh* altogether 550 years, as *zumindars* and rulers, and their overthrow by the men of *Soomah* was occasioned by the tyrannies of the governor *Humeel*, in the year of the *Hejira* 752 (A. D.

Nasir-ud-deen Kubajeh, his rule and death.

1351,) when their dynasty ceased.* Previous to this period, *Nasir-ud-deen Kubajeh* who was deputed at the time of *Shums-ud-deen Ooltumsh* of *Delhi*, governor of *Sindh*, about the year 610 H. (A. D. 1213,) declared himself independent. A force under *Jhingiz Khan* invaded the country. *Nasir-ad-deen* not being prepared to oppose them, entrenched himself in the fort of *Mooltan*, where he was besieged for forty days; but the besiegers were obliged to return unsuccessful. Many of the great men of *Khorassan*, *Ghoor*, and *Ghuznein* fleeing from the oppression of *Jinghiz Khan*, came to *Nasir-ud-deen* at *Mooltan*.

In the year 611 H. (1214 A. D.) *Mulck Khan Khuljee* made an incursion upon *Seeostan*. *Nasir-ud-deen* marched to oppose him; the army of *Mulck Khuljee* was defeated, and he himself killed.

In the year 622 H. (1225 A. D.) *Shums-ud-deen* took an army to *Oochch*, to overthrow *Nasir-ud-deen*, who had entrenched himself at *Bukkur*; to this place *Shums-ud-deen* detached *Nizam-ul-Moolk*; but

His death. *Nasir-ud-deen* in attempting to escape from *Bukkur*, took boat, which foundering in a storm, he was drowned.

* The rule of the tribe of *Soomrah* in *Sindh* is far from being clearly made; but in the manuscripts consulted in this sketch, the authors confess their want of authentic record, and *Meer Massoom*, after a very unsatisfactory account, closes it by saying: "If any of my friends know more on this subject, let them publish it; I have said all I can upon the matter." Nor is the author of the *Soofut-al-Kiram* more explicit; (vide his contradictory statements); but it is generally received, that from the date of sending *Nasir-ud-deen* to *Sindh*, until the rule of the *Soomas*, (about 200 years,) *Sindh* was annexed to *Delhi*.

Geological Report on the Valley of the Spiti, and of the Route from Kotghur. By Capt. HUTTON, 37th N. I.

[The paper now published, completes a series of notes of a journey to the Spiti Valley, undertaken on account of the Asiatic Society, by Capt. Hutton, 37th Regt. N. I. It was with those which have already appeared placed at the disposal of the Editor of this Journal by the Committee of Papers. The results of the author's geological observations have induced the adoption of theories, upon which the Editor is only competent to remark in so far as the identification of the opinions of a publisher is concerned with those of any writer, to whom he is enabled to offer a medium of communicating his views to the public.

In the belief that hardly any novel theory could be broached, which would be unproductive of good results, (if not by its intrinsic merits, at any rate by the consequence of the discussion it might excite,) the Editor has great pleasure in giving publicity to this paper, for the views contained in which the author is alone answerable.]



The valley of the Sutledge is that portion of the western Himalya which, as its name implies, forms the tract of country through which the river Sutledge flows.

The term *valley* is however scarcely applicable to it, since it is strictly speaking nothing more than a deep and rugged mountain glen, of more than ordinary sternness and magnificence, often affording from the abrupt rise of its rocky sides, a mere channel for the roaring torrent which winds its irresistible and headlong course along its sheltered bed.

On either side rise high and snow-clad peaks, forming along the river's course two mighty walls, whose dark and furrowed sides proclaim the constant warfare which is waged by frost and heat alternately.

Villages are numerous along the river's course, sometimes placed near the water's level, at others raised high above it on the mountain's side, surrounded by their cultivation cut in steppes, and sheltered by the stern and frowning cliffs which raise their hoary summit far above it.

In the lower part of the valley, commencing from Rampore downwards, to below Kotghurh, vast beds of rolled and water-worn stones are seen accumulated on the river's banks, and rising high above the water's present level. Such deposits evidently owe their origin to the eddies or back waters of some far mightier stream than that exhibited by the Sutledge in the present day, even at its greatest height, and must undoubtedly have been formed by the rush of water attendant on the outburst of some enormous lake or *lakes* in the higher portions of the hills.

These deposits extend in many places along both banks of the river, and appear to have been formerly one solid mass of debris, which as the waters gradually disappeared, have become divided by the current of the stream.

These are for the most part situated at those places where the Sutledge takes a rapid turn, and have been evidently thrown up *within* the elbow by the eddies, or back waters.

On the surface of these broad and flat alluvial deposits, now flourishes an abundant cultivation, consisting of barley, wheat, rice, tobacco, poppies, &c. which being situated high above the river's level, are irrigated by the minor streams, which are furnished from the heights above them.

Higher up the river's course the valley narrows, and forming in many parts a mural cliff on either bank, gives a mere passage to the foaming stream, which rushes with a hoarse and deafening roar over the boulders which obstruct its progress, and dash its waters in muddy waves on high. Some hundred feet above the stream the hills are clothed with dense and stately woods of oaks and various sorts of pines, among which the "Ree," producing the edible seed called by the people "Neoza," is in great abundance. Above the belt of wood, are seen to rise huge rocky spires, along the rugged line of mountains, bare of all vegetation, and crowned by everlasting snows. From these snow-clad heights are furnished numerous streams, which rushing downwards in a sheet of foam, furrow the mountains sides with minor glens, and join the Sutledge as it rolls along below. Now and then the forests cease, and wide grassy tracts succeed, affording pasture to multitudes of goats and sheep; while here and there the whole hill side has slipped away, and left a mural height of precipitous and crumbling rocks, which are annually precipitated into the depths below by the expansive powers of the frost and snow.

The general features presented by the Geology of these hills, may be briefly and summarily comprised in the following observations :—

The main or central range of the Himalya or true snowy mountains, runs in a general direction from East-South-East to West-North-West, sending off branches or spurs in every direction, intersected or divided everywhere by deep and precipitous valleys, whose narrow bed or bottom almost invariably serves as the channel of some mountain torrent or rivulet, whose waters are supplied from the snowy heights above. Where the sides of these valleys are of sufficient elevation to retain the snow throughout the year, these rivulets receive a neverfailing supply of water; but, on the other hand, if the enclosing walls are of moderate or medium elevation, the vallies are often dry for several months together.

The vallies, it must be borne in mind, are not to be attributed, as some have contended, to the gradual wear and tear of the weather, and the streams which now drain through them, but have been formed by the convulsive uprise and disruption of the lofty mountains which form their sides; the glen or valley being thus a mere ravine or trough lying between them, and furnishing often just room sufficient for the passage of an insignificant stream.

The existence of the valley is not therefore to be attributed to the ablations caused by the constant action of the waters; but, on the other hand, the presence of the rivers and streams within them is entirely owing to the configuration of the mountains, which furnishing on the heights vast beds of snow, are ever sending down supplies, which naturally gather in the hollow troughs below, and gradually wind their way to form a junction with some larger stream, which in its turn seeks out the noble rivers of the plains.

It would therefore appear, that the existence of these hill streams is altogether owing to the previous formation of the vallies by the uprise of mountain ridges, the intervention of a glen or *khud* being the natural consequence of disruption in a range, or the sudden alteration of direction of the upheaving power, thus often causing ranges to intersect or to run parallel with each other. Thus the vallies are in no wise the consequence of the unceasing action of the streams, which now find a fitting channel in their depths.

In the present day, these glens usually communicate or open into some other, and the waters gradually escape, but doubtless time has been when their enclosing barriers were continuous, and numerous lakes were formed, until the weight of waters accumulated from the melting of the snows, burst through the rocky walls and so escaped. This is indeed a fact and no wild theory, for the people of different parts of the hills still hold traditions of such events. Dr. Gerard, I think it is, who mentions, that the natives informed him the valley of the Buspa was once closed at the lower extremity, and contained a lake, traces of which may still be seen along the banks of the present stream. A similar lake once occupied the glen in which the town of Soongnum now stands, and thick alluvial deposits containing rounded pebbles may still be seen in some of the higher parts of it; from the lower portion they have been swept away by the out-rush of the waters.

Of this, however, I shall speak again hereafter. The dip of the strata is, as might be expected in such a vast and often confused assemblage of mountains, excessively variable; and although previous travellers have uniformly insisted much on a N.E. dip, it will be quite as often found

to lie in an opposite direction. The prevailing inclination of the strata may therefore be said to be N. E. or S. W. It is, however, remarkable that the latter dip, although perceptible on both sides of the snowy range, is more prevalent on the northern than on the southern side. It has also been pointed out as matter of astonishment, that while one aspect of the mountains presents a gradual and shelving face, rich in soils and forest scenery, the opposite exposure is, on the contrary, found to present a bare and often mural cliff. This, however, is no just cause for astonishment, as the circumstance where it occurs is simply owing to the outcrop of the strata being on the precipitous side, while the dip of the other forms a more shelving slope. But this circumstance is by no means confined to any one direction in particular, for the outcrop of strata is no more prevalent on the northern than on the southern or any other exposure. It may, however, be taken as a general feature in all mountains, that while the dip or inclined position of the strata gives on the one face a shelving surface for the growth of plants, the other face or outcrop must necessarily be rugged and nearly barren, as furnishing by its precipitousness no resting place for soils. In this respect the Himalya does not differ from other mountain ranges. Travellers, however, having no knowledge of geology, and witnessing these facts, have sought to solve the problem by bringing to their aid supposed peculiarities of soil, of aspect, or of climate.

Viewed at a distance from the plains of India, these hills appear to form one long continuous chain or ridge, entirely clothed with everlasting snows, and this line has been designated by way of pre-eminence or distinction, by the name of the "snowy range," or "region of perpetual snows." Arrived within the mountains, and perched aloft upon the summit of some portion of this mighty range, the traveller is surprised to find that what he had been led to consider one continuous field of snow, is nothing more than a vast assemblage of scattered and far distant peaks, approximated apparently by the distance at which they were wont to be viewed into one wide-extending line, and forming component parts of the same snow-clad range.

He is surprised to find the greater portion of that line to be absolutely devoid of snow during several months of the year, except within the deep and sheltered glens, to which the rays of the summer sun can only penetrate for a few short hours during each day, and where frost resumes its sway the moment his beams are withdrawn or intercepted by some towering peak.

Far beyond the ridge which he has hitherto been accustomed to distinguish as the snowy range, he now beholds gigantic and frowning masses clothed in the winter garment, rising often in isolated peaks to

an elevation exceeding that of the main or central chain on which he stands.

Around him, far and wide, he beholds these rugged and awe-inspiring peaks rising pre-eminently grand amidst the sea of mountains by which he is surrounded, and he now first learns that the line of snow he has witnessed from the plains, is the wintery sheet which envelopes these often widely separated masses, but which to the eye of the far-off observer, have become blended by the distance into one long line of continuous snowy peaks.

The central range, and all the hills, with the exception of these loftiest peaks and some deep secluded glens, usually lose the sheet of snows during the period that the monsoon is raging in the plains. It is at this season that the snows send down the greatest supplies of water to the rivers, commencing about the end of May and continuing till September, when the frosts again arrest the dissolving snows, and the mountains once more put on the pure and dazzling robes of winter, and continue thus enveloped in one sheet of snows until the approach of summer again relieves them.

No sooner has the wintery garment disappeared, than a fine rich sward at once springs up, almost as if by magic, so rapid is the vegetation in these high tracts,—affording abundant pasture to the flocks and herds, which then range over them to the height of 15,000 feet above the sea.

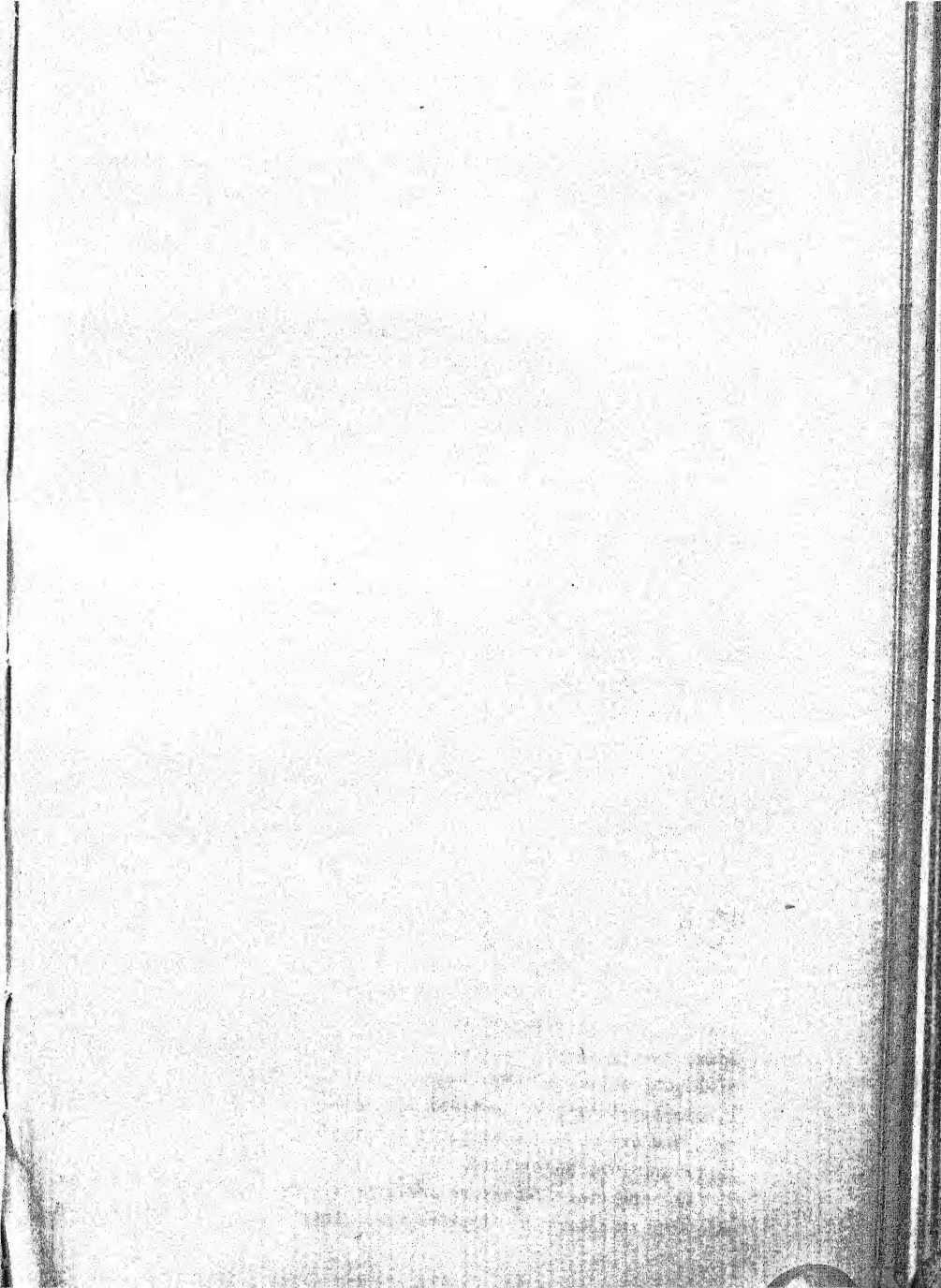
This smiling and verdant state of things is, however, unhappily of short duration, appearing like the transient gleam of sunshine that often precedes the fiercest storm, yielding in the space of two short months to the drifting whirlwind and wreaths of snow, that soon enshroud the whole in cold and dreary solitude.

Journeying from Kotgurh, in the lower hills, towards the Spiti valley, the geological formations which came under my observation from that station to the frontiers of Tartary, were exclusively of the primary class.

Commencing at Kotgurh, and crossing the brow of the hill above Kaypoo, we find strata of *mica* and *hornblende schists*, jutting up through the surface, interspersed with veins and nodules of *quartz*.

These veins are often found to contain *iron* disseminated in small thin scales resembling *mica*, and in such cases the *quartz* is generally in a state of decomposition. This ore pays no duty to Government, and the mines, if indeed such they can be called, are seldom worked, being so unproductive, that out of 14 lbs. weight of the rough ore only 2 lbs. of iron, and that impure, can be procured.

Veins and masses of coarse primitive *calc spar* or *carbonate of lime* are also seen to accompany the *mica slate*. These rocks continue, with an



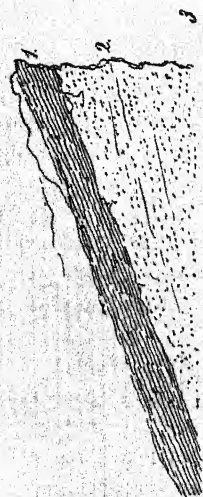
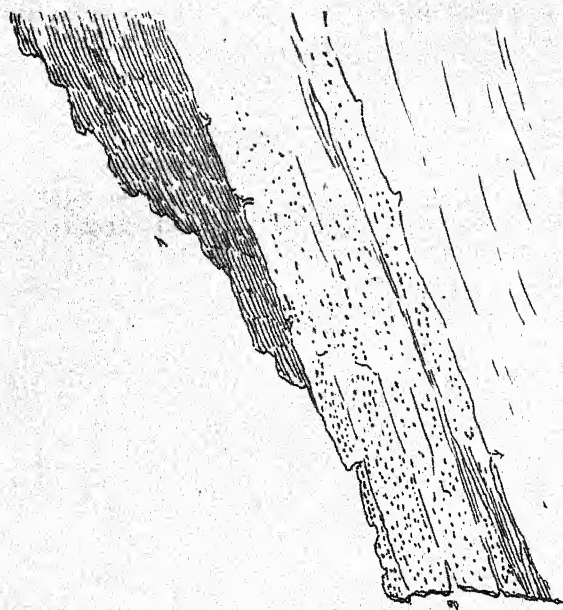


Fig. 1.

occasional bed of *porphyritic gneiss*, until we reach Rampore, half a mile beyond which a fine white *granular quartz* occurs, underlying *mica slate*.

These strata dip strongly to the N. E., and are seen on either side of the river, by which they appear to have been transversely divided, the lower end dipping down on the right bank, while the upper portion forms a high mountain on the left.

I say these strata have been *apparently* divided by the Sutledge, which now flows through them, because such *in reality* has not been the case; but the bed of the river lying through them, is entirely attributable to the disruption of the strata at this point having formed a fitting channel for the waters to escape through to the plains.

(See plate)—FIG. 1.

1. 1. *Mica Slate*. 2. 2. *Granular Quartz*. 3. *Bed of Sutledge*.

The surface of this *quartz rock* takes a yellowish rusty hue when exposed to the weather, but when freshly fractured, it is of a pure white, somewhat resembling Carrara marble in appearance, but of a coarser texture.

Onwards from Rampore, the *mica schist* is seen in several varieties, sometimes appearing to be composed entirely of *mica*, at others containing a predominance of *quartz*; in these cases the strata are either soft and crumbling, from the *mica* scaling off, or very hard and flinty, from the quantity of *quartz*.

Silvery mica passing into *chlorite schist* is abundant near Goura, and from its soapy and decomposing nature, the whole rock has in many places split away altogether, leaving a constantly decomposing cliff, from which in wet weather large masses are constantly falling.

Further on, the *mica* is seen to contain numerous small crystals of *hornblende*, which cause it to pass gradually into *hornblende schists*. Garnets of small size occur occasionally imbedded in the *mica*, which also contains masses of *white quartz*, in which beautiful crystals of *cyanite* are interspersed, varying in shade from pale sea green to bright blue.

The characteristic rocks, however, from Kotgurh to Sarahun are *mica* and *hornblende slates*, frequently alternating with each other, and imbedding blocks of *porphyritic gneiss* and *white quartz*.

From Sarahun the *gneiss* begins to shew itself as the prevailing rock, and occurs both common, red, and *porphyritic*;—*mica slate* and *hornblende* are also frequent, and when they come in contact, the *mica* often becomes jet black.

A few miles from Sarahun, on the right bank of the river, an interesting appearance presents itself in the disposition of the strata. The dip which up to this point has been pretty uniformly to the N. E., now gradually rises, and preserving for a short distance a nearly horizontal position, at last lifts itself abruptly, and dips back again to the S. W. at the same angle of about 45° .

From this disposition of the strata it becomes evident, that they have been lifted or upheaved at both ends, from the horizontal position they once had, by some volcanic force. The lowest strata exposed to view at this spot are on the right bank of the river, nearly even with the water, and form a complete arch immediately under those strata which dip to the N. E. I annex a slight sketch made on the spot, which will serve to show the position of the rocks, better than a description. (*See plate*)—FIG. 2.

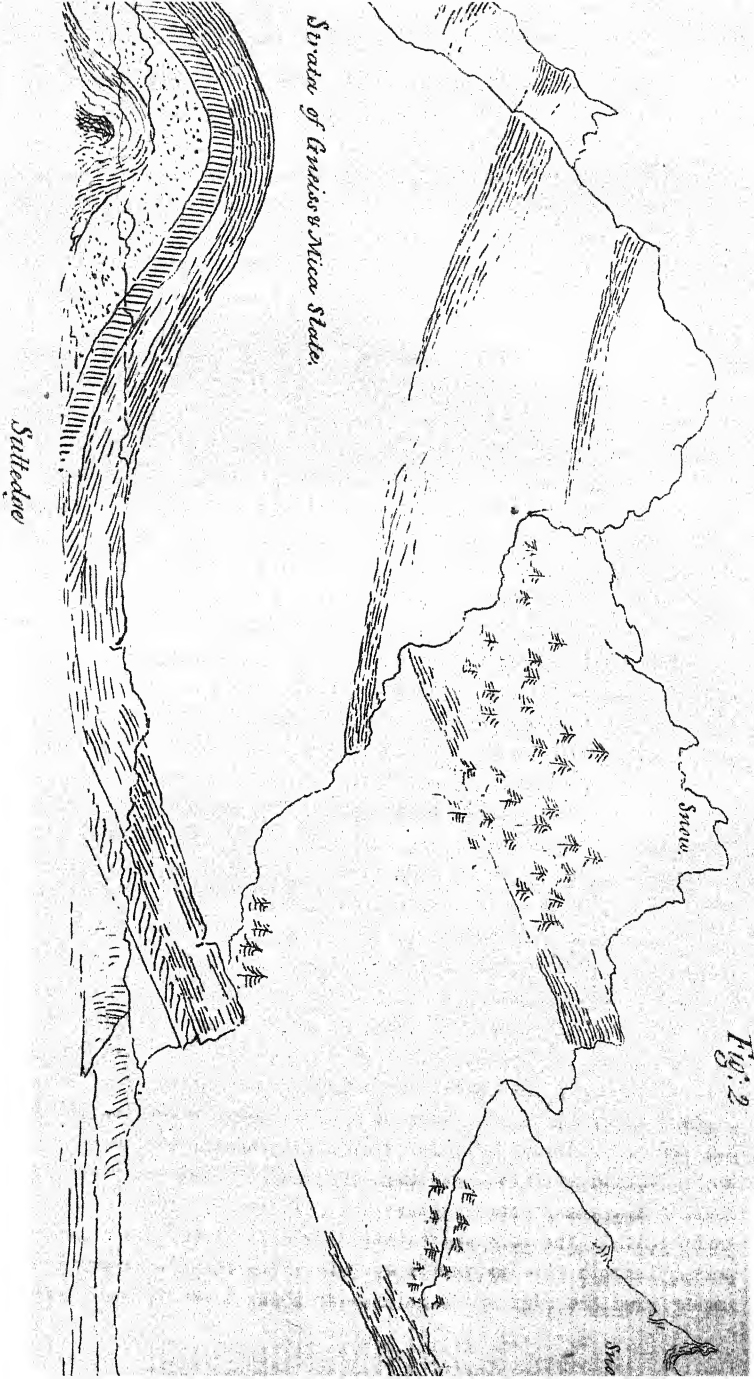
Beyond this, as we approach Traada, a fine white *granite* is observed, containing large scales or crystals of *mica*, and farther on still, about Nachar, *white felspar* becomes abundant, imbedding the same *mica* crystals, and forming the first division of the *granite* of some geological writers. *Quartz* also occasionally entered into its composition and formed true *granite*, with which were found *hornblende* and *mica slates*, *porphyritic* and *granitic gneiss*. In some instances where the *hornblende* and *granite* were in contact, the *mica* of the latter rock assumed a black and glossy appearance, producing a variety of *granite* of some beauty.

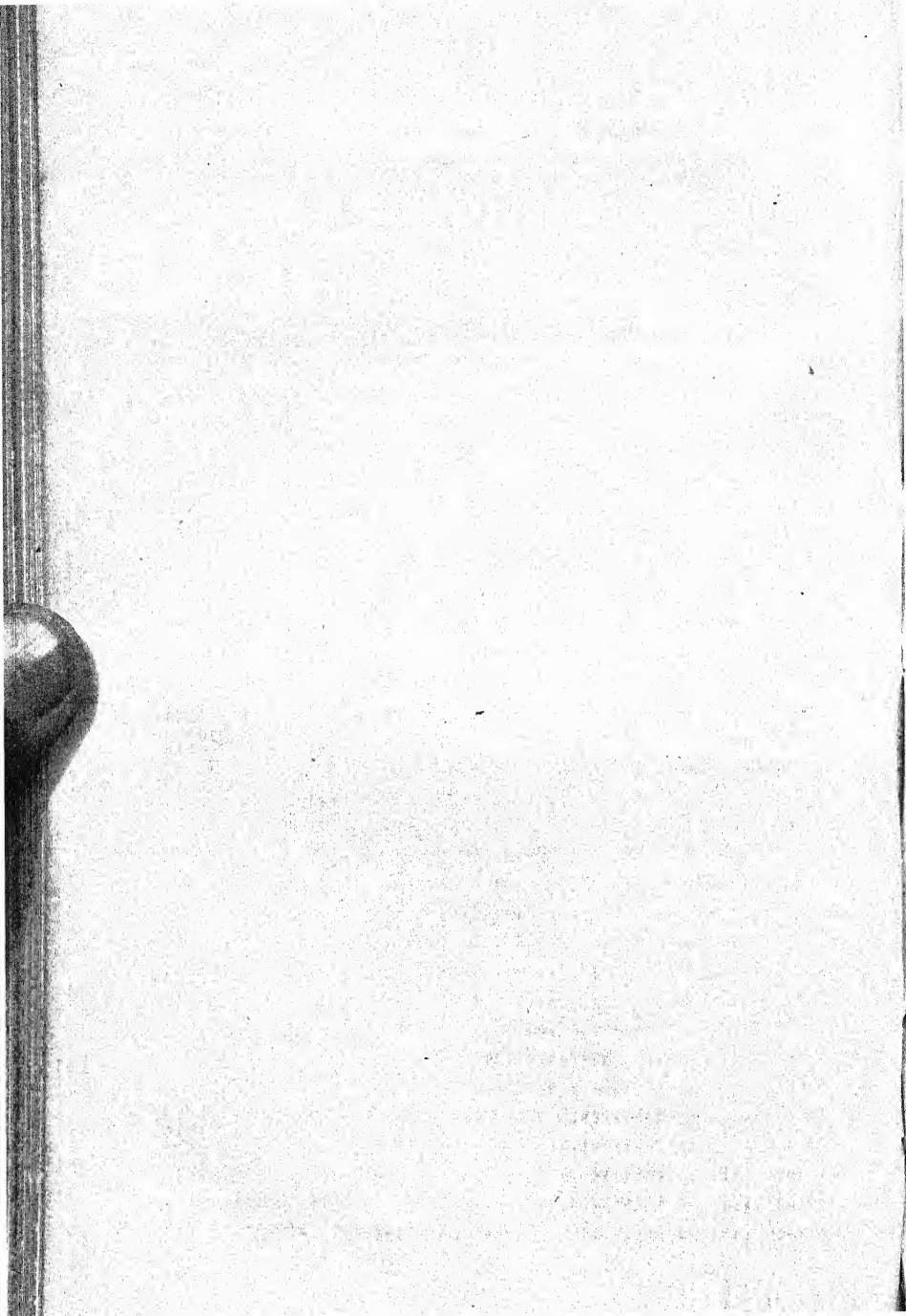
Proceeding from Nachar, the road passes over formations similar to those already mentioned, and a few miles lead down to the Sutledge, which is crossed by a good broad *Sangho*. At this point the rocks rise abruptly in huge masses on either side, confining the river to narrower limits, and affording a mere passage for its waters.

These rocks are of *gneiss*, and the stratification which previously had often been indistinctly discernible, now ceased altogether, and the beds presented a shattered and amorphous mass,—a circumstance by no means of rare occurrence among this class of rocks.

From the *sangho* to Chergong the road still continues along the bank of the river over beds of boulders and broken rocks of every size, consisting of *granite*, *gneiss*, *mica*, and *hornblende slates*. Here too *cyanite* again occurred in *quartz*, and crystals of *crysoberyl* (?) in *granite*.

From Chergong to Meeroo the strata of *gneiss* are often laid bare by the descent of streams from the snows above, and the dip is seen falling to the N. E. at about the usual angle of 45° . Beyond this place occur thick beds of *mica slate*, containing *garnets* in profusion, and often, from the decomposition of the rock, the whole road is strewn with *garnets* of various sizes. Beneath this bed occurs one of *white quartz rock*, which is seen rising from the edge of the Sutledge to about 3,000 feet in thickness.





Near Chini, the *mica slate* contains occasional small crystals of *cyanite*, and sometimes passes into *chlorite slate*.

A short distance from Chini, the whole hill side has slipped down into the Sutledge, from the action of frost and snow, and the cliff now towers up from the banks of the river, presenting a sheer and perpendicular wall of between six and seven thousand feet in height. This vast mass is composed throughout of *gneiss*, and the road, which is a mere scaffolding, passes along the face of it, at 4,000 feet above the Sutledge, which is seen foaming below.

From this to the village of Leepee, the formation is pretty nearly the same, consisting of *granite*, *gneiss*, *hornblende*, *mica*, and *quartz*.

The *granite* about Punggee, Rarung, and Junggee, contains a large proportion of *hornblende*, and at Rarung it is also seen to assume a brick red colour, often traversed with veins of *quartz*, both red, amber, and white. The red *granite* appears only in masses imbedded in a yellowish variety, which is the true rock, and which towards Leepee gives place to *gneiss* and *mica slate*. Above the last mentioned rock commences the first bed of *argillaceous slates*, which continues interstratified with *greywacke schists* to the top of Roonung Pass. The alternations of these strata are frequent, sometimes the one and sometimes the other rock prevailing in thickness.

These beds are evidently the first indication of the transition, or lowest secondary formation of geologists, and extending across or through the Roonung Pass, downwards to Soongnum, they are seen to support strata of compact *greywacke*, and beds of *quartzose* rock, apparently analogous to and holding the place of the *old red sandstone* of Europe.

The town of Soongnum stands in a valley immediately between the Roonung Pass in its front and the Hungrung Pass in its rear. In front, the range of hills which form the right side of the Rushkoolung valley are composed of an *argillaceous* series, consisting of *clay stones* and *greywacke slates*, of different textures and degrees of induration, and dipping to the S.W. The strata in the rear of the town, forming the left bank, dip, on the contrary, to the N. E. and are composed of *greywacke slates*, compact *greywacke*, *old red sandstone*, and a superior stratum of *limestone* and *greywacke*. These towards the summit of the range gradually change their dip, and rise up again to the S.W., the whole being surmounted by a bed of dark blue secondary *limestone*, containing portions of *clay* and *silex*. This formation extends along both sides of the Rushkoolung valley, even to the Manerung Pass above Manes in Spiti, a distance of about seventeen miles. About seven miles from Soongnum, copper veins occur in their strata of white *quartz* rock, and *veinous quartz*, lying occasionally between, or ramifying through, the *greywacke* and *old red sandstone*. The

last mentioned rock varies much in colour and in texture, the lowest stratum being *white*, and scarcely distinguishable from *quartz* rock, but changing gradually to a faint tinge of *pink*, becoming deeper as it passes upwards, until its colour is of a dull *purplish* hue.

These strata are sometimes separated by a very thin layer of soft whitish *marl*. The crest of the Hungrung Pass is 14,837 feet above the level of the sea, and is composed of dark blue *limestone*. The range on which this Pass is situated divides Kunawur from Hungrung,—a district inhabited by Tartars, who are subject to Bussaher.

Descending from the Pass to the village of Hungo, the road passes over numerous alternations of blue *limestone* and *greywacke slates*, resting upon white *quartz*, which lower down gradually passes into a greenish variety of the same rock.

These strata all dip to the S.W., and are probably an outcrop of those which run in a N.E. direction from behind Soongnum, and thus shew the effects of what may be termed a *double upheavement*, or lifting of the same strata at two different points. The lofty *granitic* peaks which tower up to the right of the Pass, at once shew that they have been instrumental in forming the S.W. dip, and it is more than probable that the same rock might be discovered also protruding through the strata on the opposite exposure.

The following *partly* imaginary section of Hungrung, may serve to explain my meaning:—

(See plate)—FIG. 3.

Supposed Section of Hungrung Mountain.

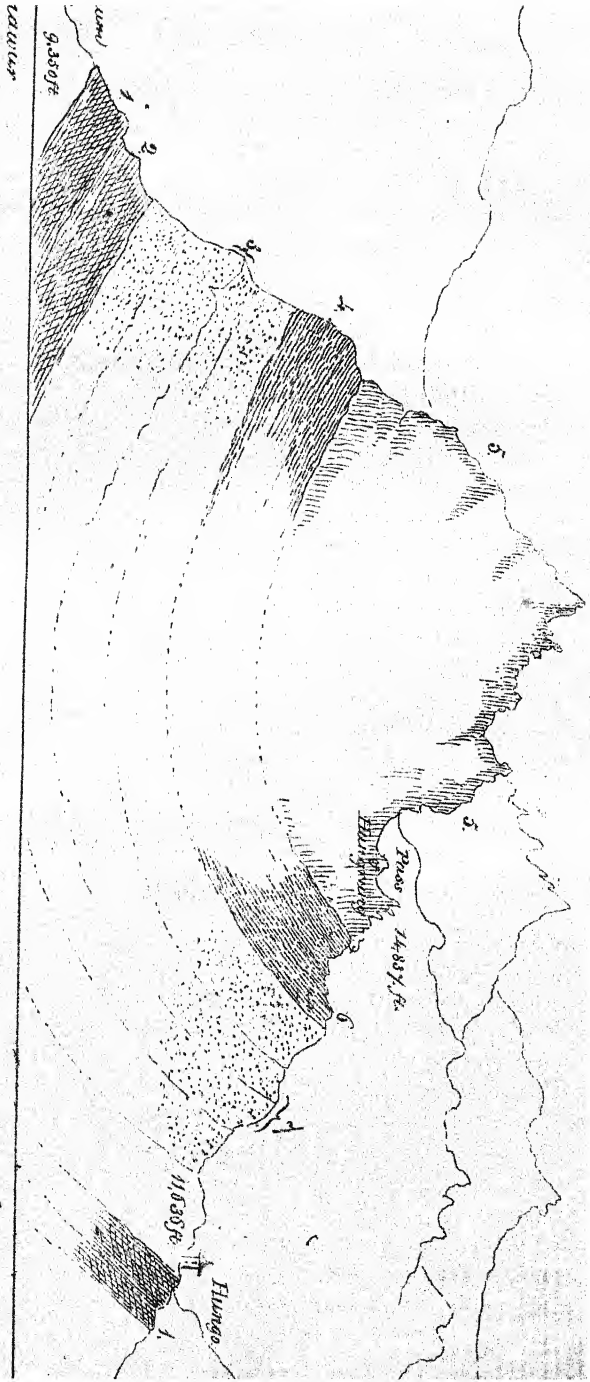
Strata of *greywacke slates* are met with for a few miles after leaving Hungo; but they disappear as we approach Leeo, or rather, from the great descent of the road, they are left far above, while the base of the mountain is found to be a dark coloured *gneiss*, traversed and intersected in every direction by veins of white *quartz*.

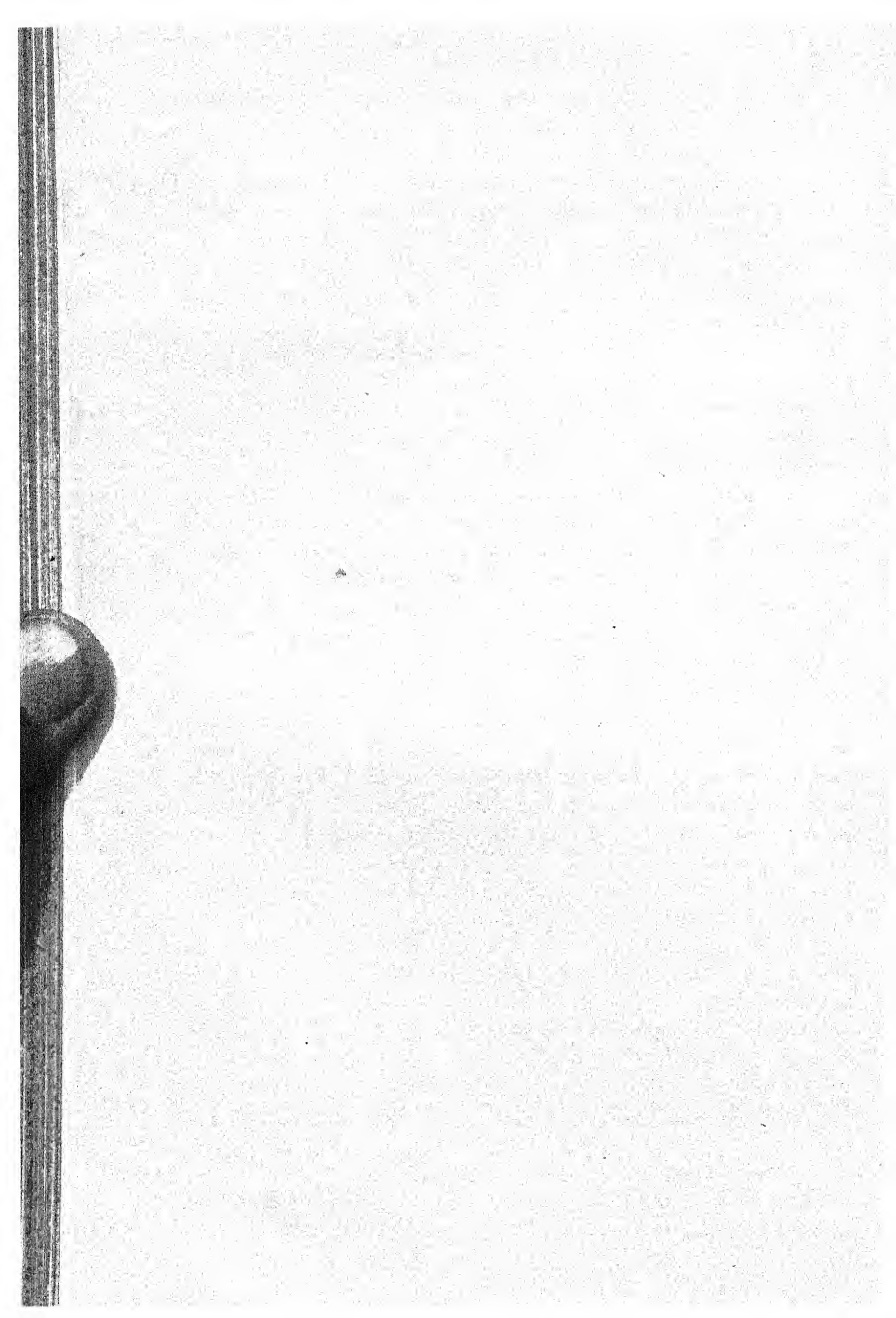
Leeo stands in a kind of basin, surrounded on all sides by lofty hills of *granite* and the same dark *gneiss*; but the lower parts of them are overlaid by strata of the secondary series, consisting chiefly of *greywacke* and *shales*. On the sides of the surrounding hills exist strong indications of the former presence of a lake, in the lines of water-worn stones and pebbles that now rest many hundred feet above the river Lee.

These appearances were long since pointed out by Dr. Gerard, who though knowing nothing of geology, was at once forcibly struck with

Supposed. Section of Huangwang Mountain

Fig. 3.





the conviction, that nothing but the former presence of deep waters could account for the phenomena here so plainly exposed to view.

In his conjectures on this head, that enterprising and unwearied traveller was undoubtedly correct.

In the bed of the Lee, where it is crossed by a wooden *sangho*, a thick bed of white *quartz rock* is seen dipping to the S.W., and as we mount the hill in the direction of Chungo, beds of *boulders*, and disjointed masses of *granite*, *gneiss*, and *mica slates* hurled from above, are passed over, now in many places overlying the secondary *shales*.

At the village of Chungo, which is the last on the left bank of the Lee, under the government of Bussaher, the most decided indications of the former presence of a deep lake again occur. To the eastward of the level patch on which the village and its cultivation stands, rise three lofty and rugged mountains, whose shattered sides present sections of the same strata as those noticed at Leeo: namely, deep beds of dark *gneiss* and *mica slates* intersected by *granitic* and *quartz* veins of various thickness; these strata dip down towards the west, and as they approach the village, are lost beneath the vast accumulations of alluvial soils, which here, as at Leeo, mark the former presence of deep and tranquil waters.

To the southward these deposits consist almost entirely of thick beds of *clays*, *sands*, and *boulders* of every size, rising high above the level of the village; while to the NNE. are again presented the same alluvial deposits of a greater thickness, and accompanied in addition by a deep and extensive bed of a pure white and friable *gypsum*. This bed is perhaps a most valuable discovery in a geological point of view, as tending to show the nature of the waters from which it was precipitated. This thick *gypseous* bed is overlaid by the *sands*, *clays*, and *boulders*, which have already been noticed. At the fort of Skialkur, on the opposite or right bank of the river, about $3\frac{1}{2}$ miles from the village of Chungo, this *gypsum* is likewise seen overlying the transition series of alternating *shales* and *sandstones*.

These deposits are now at the height of 2,000 to 2,500 feet above the present level of the river's course, or at an elevation of 12,000 to 12,500 feet above the level of the sea.

The three mountain peaks of *gneiss*, which rise up to the eastward of Chungo, are divided from each other by narrow glens, through which streams flow down to join the sea, between which and the base of these mountains, the whole alluvial deposits have been swept away, and the present cultivated plain of Chungo is therefore situated far below the surrounding alluvium, which rises like walls on either side of it.

As we proceed from Chungo towards Spiti, the road lies at first over the alluvial accumulations above-mentioned, for two or three miles, when from

the abrupt nature of the primary rocks that are hence met with, they cease to exist, except far below where a wide and shelving plain lies along the river's side, and which is entirely composed of them. From the point where the road leaves them behind, for a distance of six miles, the strata are again of *mica*, *slate*, and *gneiss*, varied with the same carious veins of *granite* and *quartz* as those of Leeco and Chungo. At this point the mountains are separated by a rapid river called the Paratee, which runs down from Chinese Tartary and joins the Spiti near Skialkur. Here the primary series may be said to disappear, and the Spiti road crossing the Paratee by a natural bridge of stone, which is formed of several large masses of *gneiss* fallen from above, and wedged firmly together over the stream, brings the traveller at once upon the secondary class. The lowest strata are therefore just perceptible where the waters cut their way through, and we thus catch a glimpse of the *gneiss* of the opposite bank, above which occurs a *talcose schist*, white *quartz* rock, and *clay slate*, dipping to the S. W. Above these are alluvial deposits similar to those of Chungo, and extending for a mile or two inland from the river, forming a flattened plain, on which stands "Kewrick," the first village of Chinese Tartary. Here again a portion of the deposit has been swept away by a descending stream, exactly as at Chungo. It is worthy of remark, that all these alluvial deposits are the deepest and most extensive when the surrounding hills have the most gradual slope, and where they retire so as to form recesses; while on the contrary, as might be expected, where the dip of the strata is rapid or acute, scarcely any trace is left of the former existence of a lake, because the deposit has been swept away by the outrush of the escaping waters.

These accumulations are likewise the most extensive at the lower end of the Spiti valley, where alone the *gypsum* is to be found. To this fact I would beg to call special attention, as it will be hereafter alluded to, and prove of some importance in the explanation of these *diluvial* and *alluvial* deposits.

From Kewrick the road runs over hills, which are entirely of the secondary class, being frequent alternations of the same rocks, as *greywacke* and *claystones*, *limestones*, and *sandstones*, and in one or two instances a trap of *greenstone* is also seen, both stratified and amorphous.

From Kewrick to the village of Larree, which is the first inhabited place in Spiti, we travel first for four miles over the edges of strata of *clay slates* and accumulations of *debris*. From the decomposing state of these strata, caused the effects of weather and a portion of *alum*, which causes them to scale off in soft flakes, the whole of the hills on either side of the Spiti river have a charred and blackened aspect, which combined with their arid and barren nature, gives a sad and melancholy appearance to the country, by no means cheering to the weary traveller.

The dip of the strata is now uniformly to the S. W., and generally at an angle of 45° , though here and there they rise abruptly to a nearly vertical position, denoting an excess of the upheaving forces from below. As we approach Larree after crossing the Gew river, the bed of which is of *greywacke slate*, we come upon a thick stratum of pure white *quartz* rock, which appears to be a continuation of the same rock which was seen at Leeo on the opposite side of the range; in contact with this, and immediately resting upon it, is another bed of siliceous rock, which passes gradually into thin strata of flinty slate. Upon this rests *clay slate*, which then alternates frequently with *greywacke* and *sandstones*. Further on we perceive masses of *gypseous breccia* formed of angular fragments of *argillaceous schists*, encrusted or cemented together by *gypsum*. This rock, if it be entitled to the name, owes its origin to the same waters which deposited the *gypsum* beds of Chungo and Skialkur; it is found overlying the edges of the true strata from which it has been formed, and occurs in rude and mis-shapen masses. To this *breccia* I would also call attention, as serving to shew a change in the waters of the lake, or at all events a decrease in the proportion of their *saline* properties. Farther on still, and nearly opposite the village of Somra, a stratum of trap is seen to occur between *shales* above and *sandstone* below; it is conformable to the true strata with which it is clearly interstratified, not causing any dislocation of the series. Beyond Larree, however, the same rock occurs again, in one place interstratified with *greywacke* and dark *blue limestone*, at another running up vertically in an *amorphous* mass through the strata, which it first dislocates and then overlies. In this case, the strata on either side of the Spiti dip to the S. W., while the rocks through which the trap has more immediately passed or been injected, are thrown boldly and abruptly from the usual course to the westward. The strata on the opposite side of the river are at the same time raised from the angle of 45° nearly to a horizontal position, and after some twisting of the strata, again with apparent difficulty regain their wonted S. W. dip. Here it is evident that the trap in question has been the molten vein whose struggles to burst upwards through the superincumbent weight of strata has been the agent which has thrown them into their present inclined positions, and in its upward course has first become partially interstratified with those which possessed the least induration or means of resistance, and then finally, as it burst through all obstacles, flowed over them in a broad sheet of molten matter, which as it cooled assumed the present solid and compact texture.

Of such having been the fact, we observe proof in the vein of vertical trap acting as a support, or upright as it were, from which the strata now incline and dip downwards.

As, however, trap is known to possess, "in a general sense, the universal common character of being unstratified, and posterior to the rocks with which it is connected,"* it becomes necessary in here stating, that it is conformable to and interstratified with those of the secondary series, to offer a few theoretical remarks on the probable means by which this partial stratification has been produced.

The interstratification of this rock, where it occurs, is of very inconsiderable extent, when compared with that of those with which it is associated, possessing by no means the wide and almost universal range of the primary and secondary series, but being on the contrary, "in a great measure limited to particular spots, more or less extensive, and to be, if separately considered, partial and independent productions."†

Let us then suppose that these secondary strata were once (which in fact they really were) horizontal deposits from the waters, which it is generally supposed were instrumental to the formation of the series to which they belong.

We shall thus perceive them to have been deep *unconsolidated* masses of sands, covered by muddy layers, which we now term *shales*. The struggles of the molten matter to procure access to the surface would, from the *heat* and *pressure* engendered by its upward course, have the effect of vitrifying and indurating the sands through which it forced a passage, and of converting them into strata of *sandstone*, while the *shale* or muddy deposit next in succession being lighter and less massive than the stream of trap, would probably rise and yield a passage between itself and the *sandstone* for the molten matter to form a stratum, somewhat in the same manner as oil would give place to a stream of water if injected through a tube or aperture below it.

The muddy deposit, however, being hardened by contact with the *lava* and by the general pressure of the uprising strata, would burst as the *sandstone* had already done, and yield a passage to the trap, which flowed through and overspread them at the surface.

Should it be contended that the outburst of a stream of *lava* such as that I have described the trap to have been, would have expended itself in a shower of ashes or cinders, rather than have assumed the stratiform structure it now exhibits, I would remind the reader that the secondary rocks are supposed to have been deposited in the bosom of a tranquil water, and that that water formed either extensive lakes or portions of the sea.

* † McCulloch's Geology.

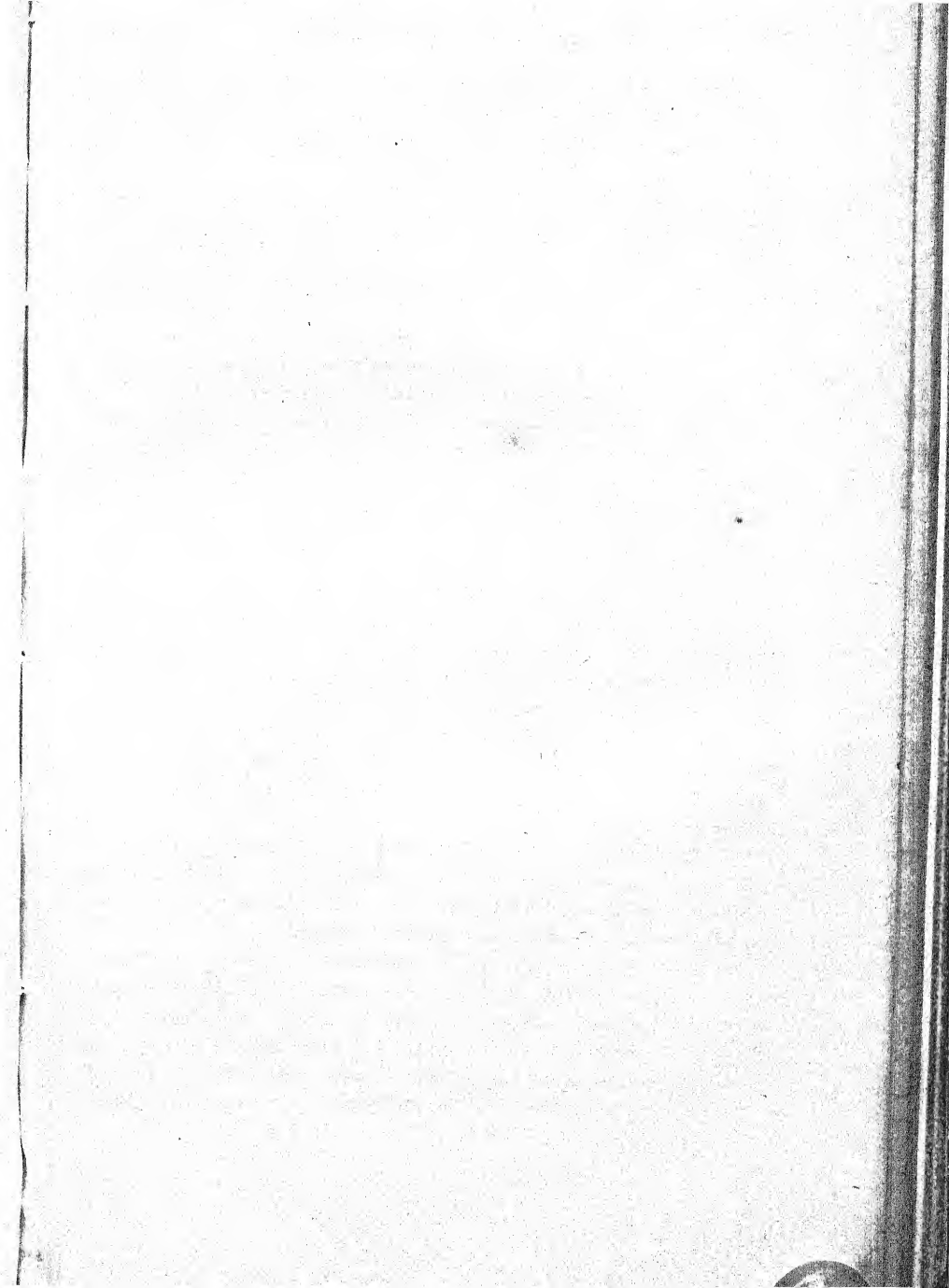
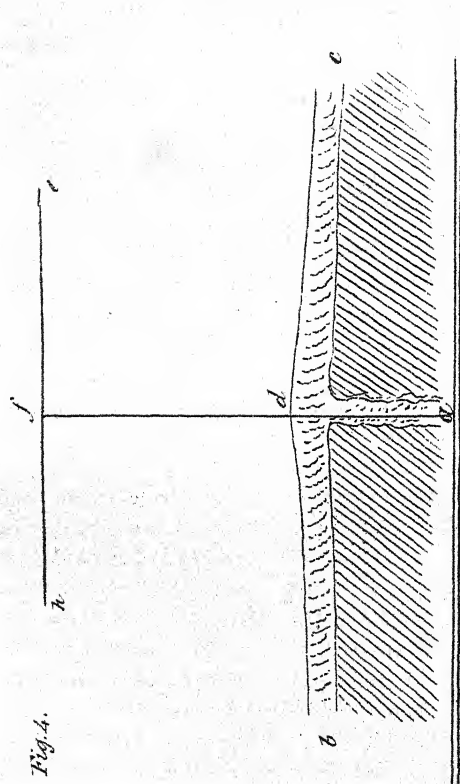


Fig. 4.



The upheaving *lava* current had therefore not only the weight of the superimposed deposits, but the pressure likewise of an enormous volume of water. It becomes more than probable, therefore, that this aqueous pressure would effectually check the tendency to produce cinders and ashes, and thus as the stream poured upwards through the deposits and came in contact with the waters, the molten matter would extend itself along the bottom of the lake, and thus overlies the secondary strata, as in the present instance.

For farther information on this subject, I would refer the reader to *De la Beche's Geological Manual*, where will be found some very just and apposite remarks on the point in question.

"It being by no means probable," he says, "that the density of sea water beneath any depth which we can reasonably assign to the ocean, would be such as to render it of greater specific gravity than liquid *lava* ejected from a volcanic rent, situated beneath the sea, it would follow that so long as the *lava* continued in a state of fusion, it would arrange itself horizontally beneath the fluid of inferior specific gravity." The question then arises, how long a body of *lava* in fusion would remain fluid beneath the waters of the sea? The particles of water in contact with the incandescent *lava* would become greatly heated, and consequently, from their decreased specific gravity, would immediately rise: their places being supplied from above by particles of greater density and less temperature. Thus a cooling process would be established on the upper surface of the *lava*, rendering it solid.

Now as the particles of fluid *lava* would be prevented from moving upwards by the solid matter above, pressed down by its own gravity and the superincumbent water, they would escape laterally, where not only the cooling process would be less rapid, from the well-known difficulty of heated water moving otherwise than perpendicularly upwards, but where also the power of the fluid *lava* to escape resistance would be greatest. (See plate)—FIG. 4. Let *a* be a volcanic rent, through which liquid *lava* is propelled upwards in the direction *d f*: the *lava* being of greater specific gravity than the water *b h e c* it would tend to arrange itself horizontally in the directions *d b d c*. The surface *b d c* having become solid, the *lava* would escape from the sides *b* and *c*, spreading in a sheet or tabular mass around; and this effect would continue so long as the propelling power at *a* was sufficient to overcome the resistance opposed to the progress of the *lava*, or until the termination of the eruption, if that should first happen."*

This clearly stated theoretic problem may now be successfully reduced to practice, and will correctly and exactly apply to the phenomenon under

* *De la Beche's Geological Manual*, p. 125.

consideration. The truth therefore of *De la Beche's* proposition will be at once established.

(*See plate*)—FIG. 5. Let us suppose these now inclined strata to be in their original horizontal position, and 2 and 3 forming beds of unconsolidated sandy and muddy deposits beneath the waters of the lake or sea *a c e h*.

Then *a a a*, &c. is a vein of *lava* or molten *trap*, which in its endeavours to find vent, upraises and bursts through the solid primary series denoted at 1.

By the heat and pressure thus engendered, the *lava* indurates the sand at 2, and converting it into *sandstone*, breaks through it also, and is thus brought in contact with the muddy deposits represented at 3. This deposit being of a specific gravity inferior to the stream of *lava*, is naturally displaced and forced to contract and furnish room for a stratum of *trap* at *a a a*.

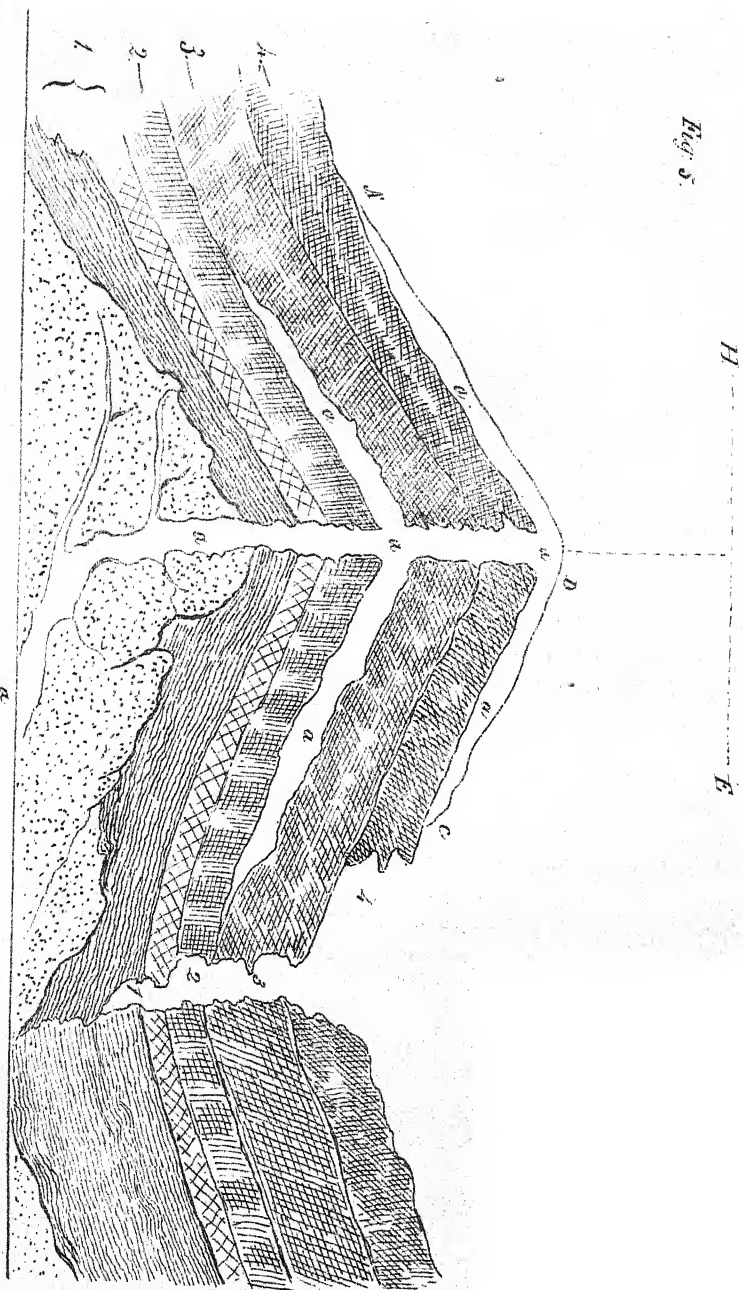
The heat and pressure, however, continuing, speedily and almost on the instant, converts the muddy deposit into *shale* or *slate clay*. And the *lava* current bursting through it and the superior stratum of *limestone*, comes at length to the surface, and in contact with the waters. Here then commences the facts detailed theoretically by *De la Beche*, as already quoted, and the stratum of *trap* spread over the surface of the now inclined and consolidated strata of deposits; while the waters of the lake or sea being displaced by the upheavement, effected an escape through the various channels afforded by the disruption of the uprising strata.

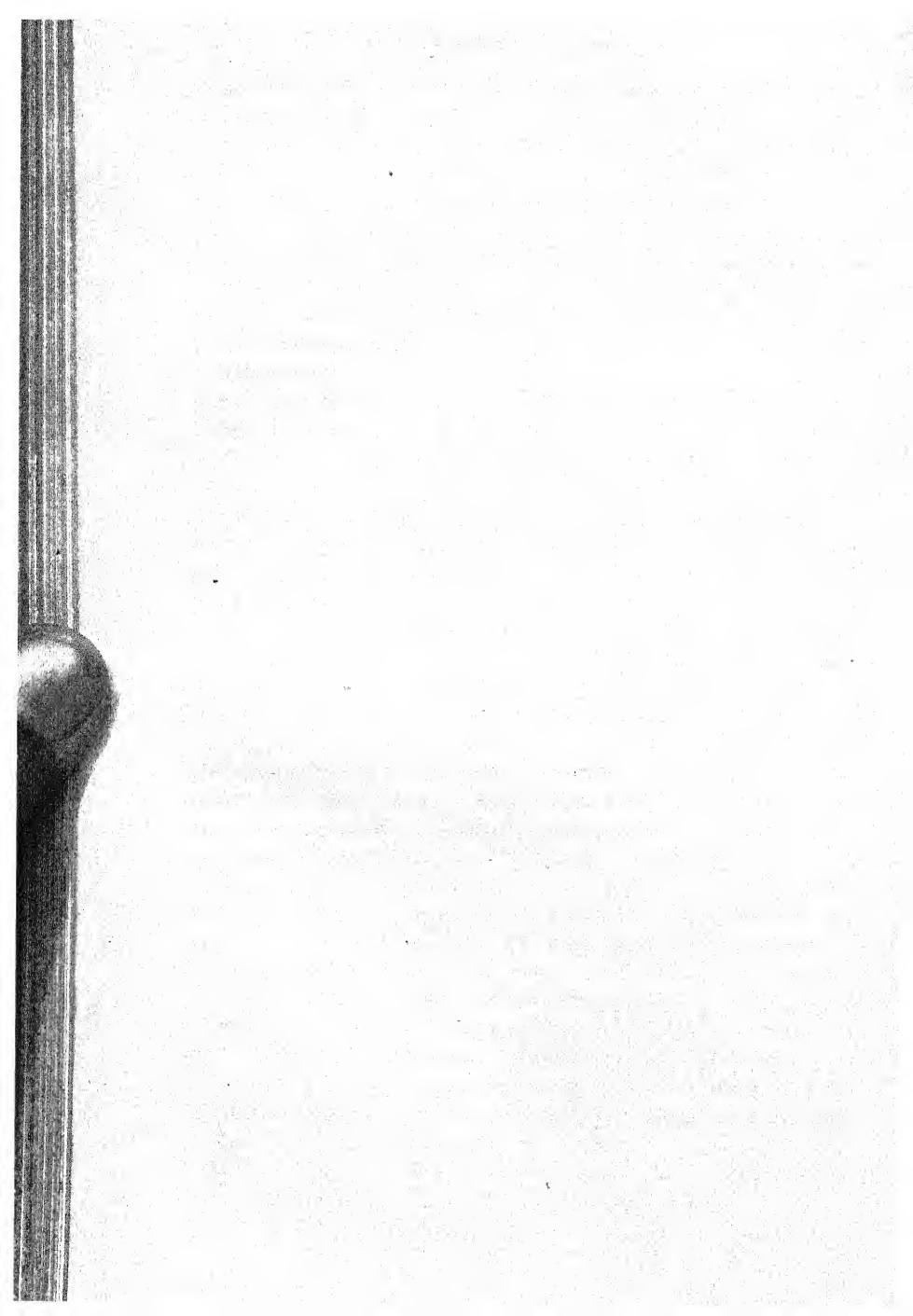
It may possibly be objected that the occurrence of a compact stratum of *limestone* above the *shale*, and in contact with the *trap*, will at once invalidate the theory here proposed, from its being a known fact, that when heat is applied to *calcareous* matter, the *carbonic acid* is driven off, and the remaining *lime* rendered infusible.

I shall endeavour therefore to obviate such an objection, by quoting and establishing a theory long since propounded by Dr. Hutton, which at the time of its proposition was looked upon as an ingenious, but perfectly untenable, doctrine.

"He had asserted that *calcareous* rocks, like every other, had been subjected to the action of heat. But it was well known that when heat was applied to this class of rocks the *carbonic acid* was driven off in the shape of *gas*, and the remaining *quicklime* become infusible. Dr. Hutton indeed had answered this by suggesting, that the pressure of the superincumbent ocean was sufficient to confine the *carbonic acid*, and to cause it to act as a flux on the *quicklime*. His theory, however ingenious, was so abundantly gratuitous, that it by no means satisfied even his own disciples. After Dr. Hutton's death, Sir James Hall ascertained by numerous experi-

Fig. 5.





ments that *carbonate of lime* might readily be fused when exposed to heat, if it were at the same time under a pressure not greater than Dr. Hutton's theory required, or about a mile and a half of sea."*

Now it is easily perceptible, that the result of these experiments is in exact accordance with the effects which the theory here proposed would give rise to.

We have supposed that the present solid strata were once soft and aqueous deposits beneath a vast depth of waters; we thus perceive a beautiful and conclusive illustration of Dr. Hutton's theory in the fact, that when the *heat* generated by the pressure and condensation from below acted on the superior *calcareous* stratum at 4, that very stratum was then actually subject to the pressure of the superincumbent waters at *A C E H*, which by preventing the escape of the *carbonic acid gas*, and causing it to act as a flux upon the *quicklime*, converted the stratum, as Dr. Hutton had suggested, into the compact state which it now exhibits.

As theoretic speculations, however just, and however much in accordance with the phenomena observable, they may prove to be, may nevertheless be deemed misplaced in a paper of this kind, I shall leave the subject for a more fitting occasion, and now pass on to a consideration of the remaining facts exhibited in the strata of the Spiti valley.

From Kewrick to the village of Leedung, the strata may be said to be of the same descriptions, namely, *talcose schist*, *quartz rock*, *greywacke slates*, *clay slates*, *sandstone shales* and *trap*, all except the last alternating frequently with each other.

A precise description of each rock belongs rather to the department of the mineralogists than to that of the geologists, and I therefore content myself with pointing out the series rather than individual species, in order that I may hasten on to the theory which the appearances presented suggest.

Passing therefore from Larree via Pokh to the fort of Dunkur, we find the strata to consist of the same alternations of rocks as those already mentioned; but at this latter spot the appearances denote a struggle for the direction of the dip, which merits some attention. The range of hills running along the right bank of the Spiti opposite to Dunkur have a N. W. by W., and S. E. and by E. direction, and at four miles below the fort the strata dip uniformly to the S. W. From that point, however, or near the village of Maness, it would seem that an upheavement had taken place through or along the centre of the range, causing the superior strata to assume a pent or roof-like appearance, throwing them on one side with

* Journal of Science, p. 4.

an acute dip to the N. E., while the opposite side preserved the S. W. direction at a less acute angle. In such cases where a section is obtained by a water course, the strata forming the heart or interior of the range are seen twisted in every grotesque direction. These strata consist of thick beds of *argillaceous schists* and *sandstones*, and what strikes one as singular in their disposition is, that the upheavement has had the effect of throwing the outcrop of the *sandstone*, or superior stratum dipping to the S.W., higher than the portion which falls to the N.E. Thus the joining of the strata is not at the summit of the range, but the rocks of the N.E. side are seen lying against those of the opposite direction, whose upper edge, or outcrop, juts out above them. (*See plate*)—FIG. 6.

Passing on from Dunkur we come to the Lingtee river, which joins the Spiti.

Here again a double upheavement of the strata appears to have taken place, which will be better understood by a reference to the annexed sketch, and which may serve as an example in all similar cases. (*See plate*)—FIG. 7.

On the right bank of the Spiti, the strata fall acutely to the river in a N. E. direction, as already pointed out, while on the left bank, although they at first dip to the same direction, they are seen first gradually to rise to a nearly horizontal position, and then to dip backwards again to the S. W. This occurs on the left bank of the Spiti and the right bank of the Lingtee at the point where the two rivers meet.

On the left of the Lingtee the strata first dip to the N. E., and then after many extraordinary twists and contortions, yield, as it were reluctantly, to the contrary dip, which turns them back to their old and proper direction of S.W.

In all these cases it will be found that the rocks are rent asunder, and the disruption now forms deep *khuds* or glens, through which at present a stream or river descends.

About six miles from Dunkur stands the village of Leedung, where the strata consist, in an ascending order, of *greywacke* and *clay slates*, dark blue *limestone shales*, *limestone* and *sandstone*, repeated in many alternations.

Leedung stands at the height of 12,037 feet above the sea, and the strata just mentioned rise precipitously above it to the height of from 3,000 to 6,000 feet more, or to 15,000 and 18,000 feet above the sea. The highest stratum here appeared to be of *sandstone*, resting upon *shale*.

To the N.E. of this village rises a Pass, which has an elevation of 15,247 feet, and here along its summit, where the streams which descend

Fig. 6.

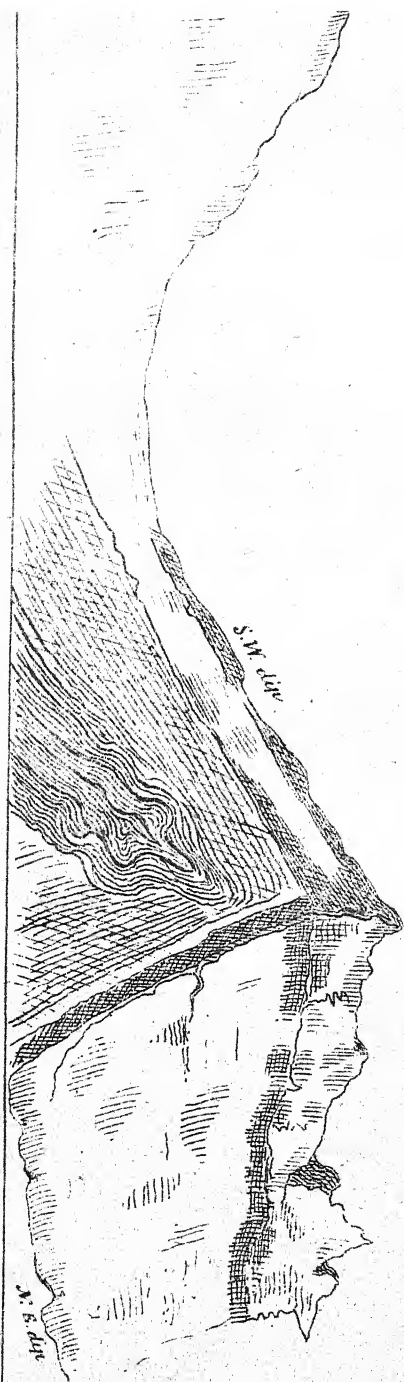
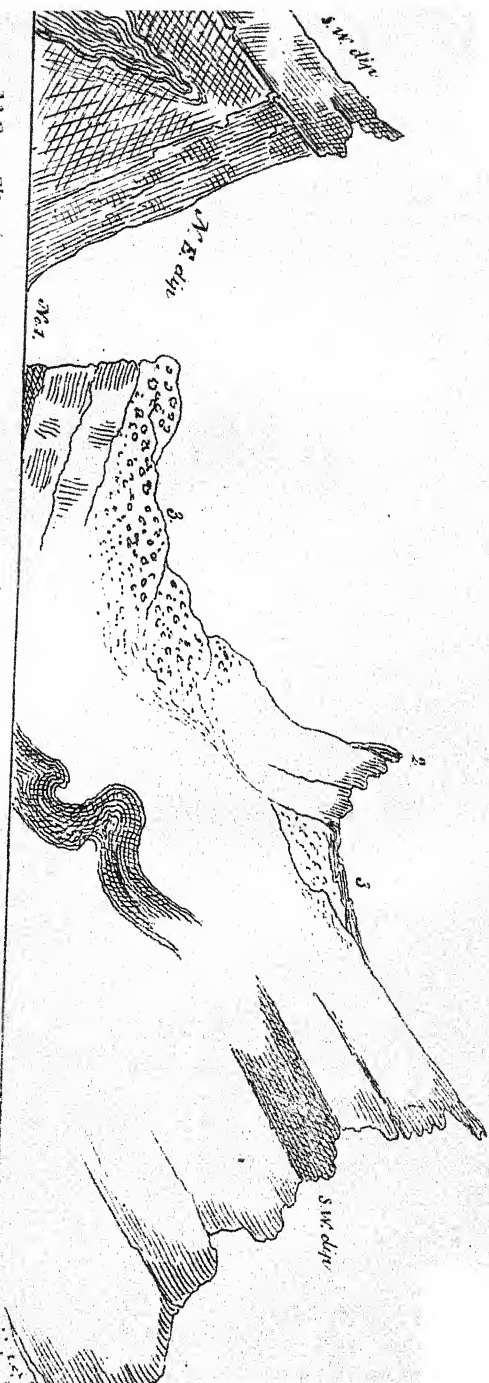


Fig. 7



N.B. The precise nature of these strata is undetermined, from the impossibility of procuring access to them; but they appear to consist of tilted shales, and limestones surmounted by sandstone.
 1. Me. Bed of Split River. 2. Tilted strata. 3. 3. Beds of debris and fragments from above.

from the snows have worn numerous channels through the loose and decomposing *shales*, occur the fossils which were long ago discovered by Dr. Gerard. These consist of various species of *ammonites*, *belemnites*, *orthoceratites arca*, and some others; but all partaking of the same decomposing nature as the *shales* in which they occur, so that it is next to impossible to procure a perfect specimen, or to prevent its falling to pieces if obtained.

The *limestones* which here alternate in the series, are sometimes wholly composed of shells, and are of a dark grey colour, while at the height of 14,712 feet occurs a bed of a whitish grey colour, and almost free from shells, but imbedding large rounded masses of various sizes, which when broken are found to be composed wholly of the dark shell *limestone* already mentioned.

Among these hills there is great confusion in the direction of the dip, the strata sometimes inclining to the S.W. or N. E., while at others they are N.N.W., and to almost every point of the compass. These masses are, however, generally limited to small extent, and appear like fragments torn from the true or main direction by the force of the upheaving agent. These strata extend along the range for many miles farther up the valley, but no fossils were apparent at any place, except on the heights above Leedung and Larra. They exist, however, in the form of shell *limestone* along the range immediately leading from the lake Chummoreel; but at this season the whole range lay so deeply buried in snow, that the route was impracticable, and I was obliged reluctantly to quit the fossil site, not half satisfied with its investigation.

From the nature of the rocks in this part of the valley, and the reports of those who have visited lake Chummoreel, I should feel strongly inclined to believe that it is situated among the *Lias clays*. Puttee Ram, the Tartar wuzeer, who has often visited the spot, assured me that the lake was surrounded by high hills composed of *earth* of various colours, red, yellow, blue, &c. and that the country around was all of similar *clays*, and not composed of rocks like the lower parts of Spiti, although sometimes above the hills of clay, large masses of stone were also found.

Such a description, all rough though it be, would lead one to expect the *Lias* beds resting on the red *marle*, and surmounted by the *sandstone* series above the *oolite*. The subject, I am sorry to think, must thus far remain obscure, until some more fortunate traveller shall venture upon those interesting scenes.

From this slight sketch it will be seen that the geological series from Kotgurh to the neighbourhood of Soongnum, in Kunawur, is that of the primary class; while thence, to the head of the Spiti valley, we find,

with slight interruption, the transition or lowest secondary series containing fossil exuviae of marine *Mollusca*.

From the point of junction of the Spiti and Sutledge to the head of the Spiti valley, we find every thing indicating the former presence of an extensive lake. These indications consist in beds of friable or earthy *gypsum*, *clays*, *sand*, and rolled *pebbles* now left high in horizontal strata above the course of the river at the present day.

These accumulations are also seen to be the thickest and most extensive at the lower end of the valley, where the mountains form recesses, and where the slope is the most gradual. We find the *gypseous* beds alone at the lower end, and we also find them growing thinner and dying out as they approach the higher and narrower part of the valley, until at last their presence is only to be traced in the incrustations of other rocks.

The *clays* and *sands* which have been deposited upon these beds are, on the other hand, universal throughout the valley wherever they could find a resting place, and they pass on after the *gypsum* has ceased up to the higher portion of Spiti, where at length they yield to *pebbles* and *boulders*.

I have called attention to these facts, because I shall presently show by what means such an arrangement has taken place.

It will, however, first be necessary to state the theory which these appearances suggest, and then to show how the phenomena presented to our view, are in accordance with that theory.

Theory of the Spiti Valley.

We have already seen that the valley bears every appearance of having been at some remote period the bed of an extensive lake, which at length, by the accumulations of its waters, and its enormous pressure upon the rocky barriers which confined it at the lower extremity of the valley, burst forth with irresistible power and devastating effects down into the district of Kunawur. I shall endeavour to trace in detail the circumstances which may have led to this outburst of the Spiti waters.

The first formation of such a lake may have occurred from one of three distinct causes, namely:—

First. If we allow the existence of these vast mountains previous to the flood, the lake may have accumulated in the bosom of the valley from the melting of antediluvian snows, and thus, (supposing the Mosaic narrative to be correct,) it will be seen, that although originally composed of fresh waters, it must have changed its nature and become salt at the period of its submersion by the deluge; and again in after years, when that deluge

had subsided, it would have gradually regained its freshness, and parted with its saline properties by the constant accession of streams from the beds of snow surrounding it.

Secondly. If these mountain ranges were formed at no remoter period than that assigned to the *subsidence* of the Mosaic deluge, the lake may have been formed simply by the accumulation of the snow streams from the heights above, *since* that last grand catastrophe.

And, *Thirdly.* If suppose these mountains to have been upheaved by *submarine volcanic* agency during the convulsions attendant on the subsidence of the deluge, we may assign the origin of the lake to the enclosing or retaining of the oceanic waters, as the ranges rose upwards from beneath the waves.

I shall presently speak of the most probable of these three causes, and in the mean time taking for granted the former existence of the lake, proceed to show by what means it has disappeared.

The walls of the valley, then, we must suppose to have been at one period continuous, without an outlet; thus forming an extensive basin containing a lake of water, which from its vast expanse and magnitude, might have been almost termed an inland sea.

The surrounding barriers of this lake rearing their heads aloft to an elevation of from 16,000 to 20,000 feet and upwards above the level of the present sea, were then, as they still continue to be, the never-failing receptacles of eternal snows, which furnished streams of ever-running waters, all emptying themselves into the broad lake beneath.

This constant increase would of course in a little time cause the waters to rise, and overflow that portion of their bounds which attained the least elevation, and accordingly we find it actually to have been so at the confluence of the present stream with the river Sutledge.

This overflowing would at first proceed quietly, and with a gently exerted force; but as the action of the never-ceasing stream gradually carved a deeper channel over the rock, a greater body of water would flow down, bursting through and tearing away blocks of increasing magnitude, until its weight and constant action having loosened and undermined the bank, the massive barrier which had hitherto sustained this enormous weight, now weakened by the repeated loss of its various supports and out-posts as it were, would at length give way before the overpowering pressure of the waters, and yield them a passage to the vales below.

Bursting with headlong fury through this, its long sought aperture, what devastation must have attended the downward passage of such a body of water! Huge fragments of rocks, together with the soils and productions of whole districts through which the torrent rushed, must have been swept off before it, and have been deposited at various distances from

their original sites, where combining with other soils, they would form strata peculiar to those situations.

It is probable that these sudden overwhelmings of the district now called Kunawur, may have happened more than once, both from this and from other lakes; for although the Spiti lake had burst through its rocky barriers and found an outlet for the superabundant waters, it would merely have expended itself to a level with the opening it had made, at which point it would again remain until the accumulating supplies from the snow-clad peaks above, and the never-ceasing flow and action of the waters upon the already ruptured rocks, should again have brought about a similar outpouring of its waves, and thus would the lake gradually sink by the same never-failing means, from level to level, until its whole body of waters was expended, and so leave those trickling and apparently insignificant snow streams which had ultimately caused its expulsion from the valley, not only to usurp its former bed, but to form by their united waters the present river Spiti.

From these facts a question naturally arises, as to the probable source from whence the vast beds of marine exuviae found in the higher portions of this valley have been derived, and the answer to it must entirely depend upon the origin we assign to the lake itself. That is, if these mountains and the lake were in existence before the Mosaic deluge took place, it will follow, that the quality of the waters must have undergone a change from fresh to salt by the influx of the ocean, and it might on this account be contended by some that the marine shells rising with the waters, were here left living when that ocean again subsided to its proper bed; that as from that period the waters of the lake would gradually part with their saline properties, as the snows around continued to pour down their limpid streams, causing the lake again to resume its pristine freshness, it becomes evident that those marine animals, exclusively formed and adapted for an existence in salt waters, could only have survived there for a short time, and would then have been deposited in one vast accumulation. But had this been the case, the exuviae must have belonged to species *still existing* in the seas, *whereas* we find them all to be the spoils of *extinct animals*; and again, had such been the case, they would have been imbedded in strata of the *tertiary formation*, whereas, we find them in those of the *secondary deposits*, which are referrible to a period *long antecedent* to the Mosaic flood.

Thus, we must at once abandon this first position.

Secondly. If we suppose that the lake was formed *at and by* the deluge, and afterwards by the constant accession of snow water became fresh,—the effect, as regards the marine deposits, will still be the same; and consequently this second supposition must be abandoned likewise.

As it is therefore evident that the presence of the fossils can be attributed to neither of these sources, we are at once led to the conclusion, that the vast ranges of the Himalyan mountains were *not in existence previous to the Mosaic deluge*, but that the rocks and strata which they now exhibit were at that time horizontal, and forming part of the bed of the antediluvian ocean. Of this I shall adduce positive geological proof in the sequel.

The fossils therefore which are found imbedded in these higher tracts, did not become extinct at the deluge, but at a period long previous to that great event, when the secondary formations in which they occur were deposited, and which period though hitherto passed by unnoticed by writers on geology, is nevertheless clearly pointed out by the sacred historian.

In order more satisfactorily to ascertain the causes by which animals once living in the depths of ocean have been left imbedded in rocks now towering to a height of more than 16,000 feet above its present level, and at a distance of many hundred miles from it, it will be necessary to skim lightly over the events which have occurred on the surface of our globe from the time of its creation, "until that last catastrophe to which these mountains owe their existence." "Geologists," says Cuvier, "have hitherto assigned but two revolutions to account for the phenomena which the strata of the earth now exhibit, namely, the creation, and the deluge, which he *rightly* thinks are insufficient, although he *erroneously* pronounces them to have been numerous." Nor is it surprising that he should have deemed them inadequate to account for such phenomena, since the first of these periods was no revolution at all, but occurred *before* the vegetable and animal races, whose remains constitute the chief phenomena of our strata, *were created*, and therefore it could have been in no wise instrumental either to their destruction or deposition. It is, moreover evident, that this first revolution of geologists could in reality be *no revolution*, but a *creation*! A revolution must imply the overthrow or upsetting of an *already established* order of things; while here in this first period we know that there was *no overthrow*, but a *setting in order* of things which had *not as yet existed*; therefore it was a *creation*, or calling into being an order of things which subsequently in after years *was to be overthrown* through the disobedience of created beings.

The separation therefore of land and sea, by which our earth was first called into existence, can be looked upon as only a creation, and such indeed it is termed by the sacred historian, for he tells us that in the *beginning* the materials from which our land was to be formed were called into being, and that on the third day, the interim being occupied in perfecting other arrangements all tending towards its welfare, the earth was separated from the waters, and its existence commenced. True, the record *mentions* two and *only two* distinct revolutions, but the Mosaic, equally with the

mineral geologist, has disregarded and passed over the first of them which occurred, *not during* but *subsequent* to the Creation, when man first transgressed the commandment of his Maker, and drew down, in consequence, the *curse* of an offended God upon the *earth* and its *productions*. Thus it would appear, that geologists are right in referring the fossil exuviae of the secondary strata to a revolution long prior to that of the *deluge*, and they have only erred in not assigning to it the actual period pointed out by the record.

The second revolution, or *deluge*, is too clearly marked, and its consequences too obvious to escape the notice of any one; but the historian enters into no details of the means by which the first was effected, although he clearly points out the effect of it. This difference in the seeming importance of the two revolutions may have arisen from the fact that the first did not, like the second, involve the loss of life to the human race, and therefore the record is content to point it out merely by its *effects*, leaving us at liberty to *infer* the causes.

Asserting therefore, with the inspired historian, that our planet, together with all its goodly furnishing of vegetable and animal life was created and finished in the space of six days, each of the same duration as these of our present computation, and that on the sixth and last day the progenitors of the human race were also created, and were consequently contemporaneous with the whole animal kingdom, as constituted before *the fall*, I shall endeavour to point out the period when, in my opinion, the marine animals, whose exuviae are imbedded in the secondary strata of the Spiti valley, ceased to exist.

Within the limits, however, which it is found necessary to assign to the present paper, it cannot be expected that I should much enlarge upon the time at which, or the causes by which this first great change in the temperature of our earth occurred, and I shall therefore pass it over with a slight allusion only, and with the less regret, since I hope at no distance of time to lay before the Society a theory of the changes which have taken place on the surface of the earth, from creation to the present time.

If in succeeding ages a writer were to state that the various countries of our present earth had suddenly undergone a great change for the worse in the prolificness and character of their vegetation, would not our posterity justly look upon it as an indication of a well marked revolution and change of temperature?

And would they not naturally seek for a corresponding change and loss in the genera and species of the animate classes?

Assuredly they might reasonably do so; then why do not we, who have a parallel case presented to us in the pages of Holy Writ, seek for traces of

that loss of animal life which must ever be a consequence of any great change or loss in the temperature and vegetation of the earth ?

Such a revolution, although no details are given of its operations, is clearly implied in the effects which are recorded in this simple language of Scripture :—

“ And unto Adam, he said, Because thou hast hearkened unto the voice of thy wife, and hast eaten of the tree of which I commanded thee, saying thou shalt not eat of it:—*Cursed is the ground* for thy sake;—in sorrow shalt thou eat of it all the days of thy life;—*thorns also and thistles shall it bring forth to thee*; and thou shalt eat the herb of the field. *In the sweat of thy face* shalt thou eat bread*, until thou return unto the ground; for out of it wast thou taken; for dust thou art, and unto dust shalt thou return.”

That earth which had hitherto profusely yielded, *freely and gratuitously*, its choicest productions, now shrinking beneath the frown of Him, before whose wrath all nature trembles, refused to supply even the common necessities of life, unless wooed into compliance by the sweat of man's brow, and the toil and labour of his hands.

Can a more convincing proof be required of a change of temperature, and of the first great revolution on the earth ?

Or, can it be thought necessary to assign to the fossils of the secondary strata a more remote period than this, in all probability, the first few months of man's existence upon the globe?†

Should such proof be required, it may at once be derived from the character of the fossil flora of the earth's strata, which although now abundantly found in northern latitudes, is wholly of a *tropical form*, and consequently the temperature of those countries must undoubtedly have been much higher formerly than at present.

It is unnecessary to enlarge here upon the several means which were instrumental to this change, and enough has been said to show, that to this epoch I would refer the extinction, and imbedding in the secondary deposits of the exuviae now under consideration, and it therefore only remains to state, that these marine formations as they are termed, remained in the bosom of the deep until the period of the second revolution or Mosaic deluge, when the mountains in which they now occur were up-raised, for the purpose of throwing back the waters from the surface of the earth into their proper beds; to serve as agents, from their accumulations

* That is—“by labour.”

† I am well aware, that many will object to this, that man did not exist upon the earth until long after the period here spoken of; but I shall be able hereafter to give proof that such doctrine is not only unfounded, but actually opposed to facts.

of snow, in reducing still more the temperature of the earth, and in furnishing those supplies to the rivers and streams, which are so essential to the welfare of organised creation; and, lastly, perhaps it may be added, to stand forth with their imbedded fossils as eternal and convincing monuments of man's fall and punishment, and of the truths so simply stated in the Scriptures.

My own opinions lead me to conclude, that when the waters of the ocean had risen over, and, as in the beginning again enclosed the earth in its cold embrace, and had effected the punitory offices for which it was permitted to transgress its bound, the lofty mountain ranges which now adorn the surface of our earth were successively upheaved through the agency of *submarine* volcanic powers, forming in the depths of ocean vast indentations or depressions, corresponding in magnitude to the masses which were upheaved upon the *opposite surface*, and into which *depressions* or *vacuities*, by the laws of nature still in force, the waters would have rushed or risen, forced down as they were by the pressure of the superincumbent atmosphere, and thus as each successive upheavement took place, the waters being *drawn downwards* would have again retired from the surface of the earth, into the place appointed to receive them; the same as on that third creative day when, as recorded in the Scriptures, they were commanded "to gather themselves together, that the dry land might appear."

Nor does this theory of submarine upheavements appear to be unsupported by the opinions of able geologists, for we find in the words of Dr. Buckland, "that *trachyte* and *lava* being ejected through apertures in *granite*, prove that the source of volcanic fires is wholly unconnected with the pseudo-volcanic results of the combustion of *coal*, *bitumen*, or *sulphur*, in stratified formations, and is SEATED DEEP BENEATH THE PRIMARY ROCKS."

Among the vast mountain ranges which were then upheaved, the Himalya stands pre-eminent, and as it rose towering upwards from beneath the waters of the *deluge*, the lake in question, and doubtless many more, may have been borne on high enclosed among its loftiest ridges. If such were the case, its waters which at first were salt, would afterwards have become fresh, from the cause already stated. Or if no such lake were borne aloft, then must it have accumulated in after times from the snows above, until bursting through the barriers of *gneiss*, which had hitherto confined it, the valley would have been left nearly as we find it in the present day.

The solution of the problem must therefore be sought for in the strata and appearances which the valley now exhibits.

* For an illustration of this, see Fig. 5.

Those phenomena and appearances have already been stated, and it therefore now only remains to show, that they are precisely in accordance with the theory proposed, and prove it to be correct.

When the vast ranges of the Himalya burst upward through the watery shroud which had hitherto enclosed the earth, the lofty ridges which surrounded the lake became at once the eternal reservoirs of everlasting snows, from which numerous streams descended, as in the present day.

The waters of the lake itself were *salt*, being taken from the ocean, and they gradually yielded to the streams which descended from the heights, until they became first *brackish*, and finally *fresh*.

The largest body of water which was supplied from the snows was that of the Spiti river, and to its current are partly attributable the appearances of the present valley.

Let us then look well to the mode of operation.

The lake was *salt* or marine; its waters after the agitation caused by the upheavement had ceased became tranquil, and as their nature began immediately to undergo a change from the influx of the snow streams, a deposit from its waters commenced. That deposit I hold to be the bed of friable or earthy *gypsum*.

The reason why it occurs at the lower end of the lake is this:—The downward rush of the Spiti waters from the heights of the *Paralassa* range, caused a strong current to advance far onwards into the valley, where it became less and less rapid, till it died away, or was checked by the body of water below.

Thus we may at once perceive, that while the fresh waters usurped the upper portion of the valley, the middle and lower parts were occupied by *brackish* and *salt* waters respectively—a circumstance that may be fully understood by observing the confluence of a large river with a gulf or any part of the sea. The river is fresh, the junction *brackish*, and the ocean *salt*.

The *gypsum* or *sulphate of lime* would therefore naturally be precipitated in the greatest quantities at the lower end of the valley, where the waters were the saltiest, and the bed would gradually become thinner as it advanced into the intermediate part where the lake was brackish, and it would be wanting altogether in the upper part where the waters were fresh. This is precisely the fact, for the upper end or head of the Spiti valley is free from the *gypseous* deposit, while towards the middle we find the rocks often incrustated with it, or forming with fragments of *shale* and other rocks a *gypseous breccia*, which becomes less *crystalline* as it advances to the lower end of the district, where it yields to the thick beds or deposit of friable *gypsum*.

While this deposit was precipitating from the changing waters of the lake, the streams from the snows were bringing in large quantities of fine alluvial particles, such as *sands* and *clays*, and water-worn *stones* of various size.

These were deposited above the *gypsum* of the lower end of the valley, and passing on after that had ceased, reached to the upper end of Spiti. This too, is seen to be the fact, for the beds of *clay* are found not only covering the *gypsum* to a great depth, but also occupying its place at the upper extremity of the district.

At the same time, the waters carried onwards an uniform solution of *clays*, which they precipitated throughout the valley, the heavier *stones* and *boulders* were forming beds at the points where the streams fell into the lake. A reference to the annexed section will show the order and disposition of the various deposits which this valley contains, and serve to illustrate the foregoing remarks :—

(See plate) FIG. 8.

Section of the Spiti Valley.

Let 3. 3. represent the fall or present line of descent of the river Spiti from Leedung 12,037 feet, to Chungo 9897 feet above the sea.

It will be at once apparent that the waters of the lake must have had an increasing depth towards the lower end of the district, and that they were fresh about A ;— brackish about B ;—and salt at C. The *gypsum* was therefore deposited at the lower end, and is represented as lying within the triangle 2. 2. 3.

At the same time, above this *marine formation* a thick stratum of alluvial deposits took place, forming a *fresh water formation* throughout the valley, as represented within 1.1. 2. 2.

The height at 1. on the left hand is 12,037 feet at the village of Leedung, and the corresponding elevation at 1. on the right hand is the height of the aqueous deposit about Chungreezing above Chungo, which is also 12,037 feet, thus beautifully exhibiting the line of the former surface of the alluvium.

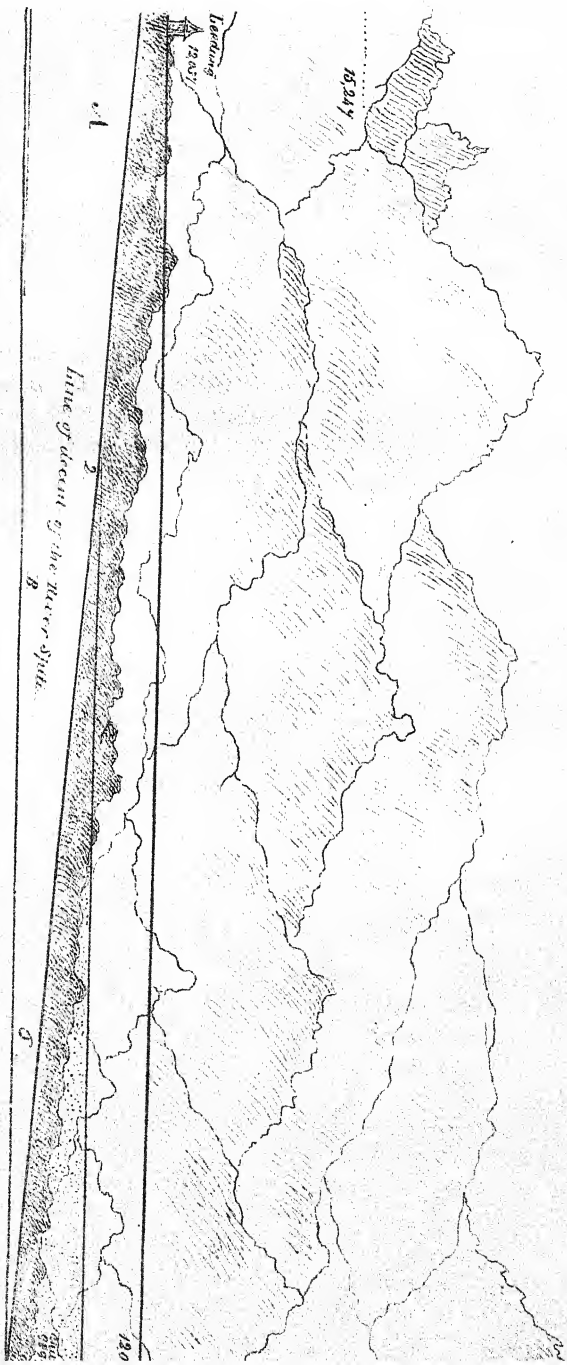
Above this the waters rose and filled the valley, till they procured egress at the lower end, beyond Leeo.

Thus from the appearance of the district we gather, that it has once been the bed of an extensive marine lake, whose waters having at length burst through their barriers, have escaped by the channel of the Sutledge.

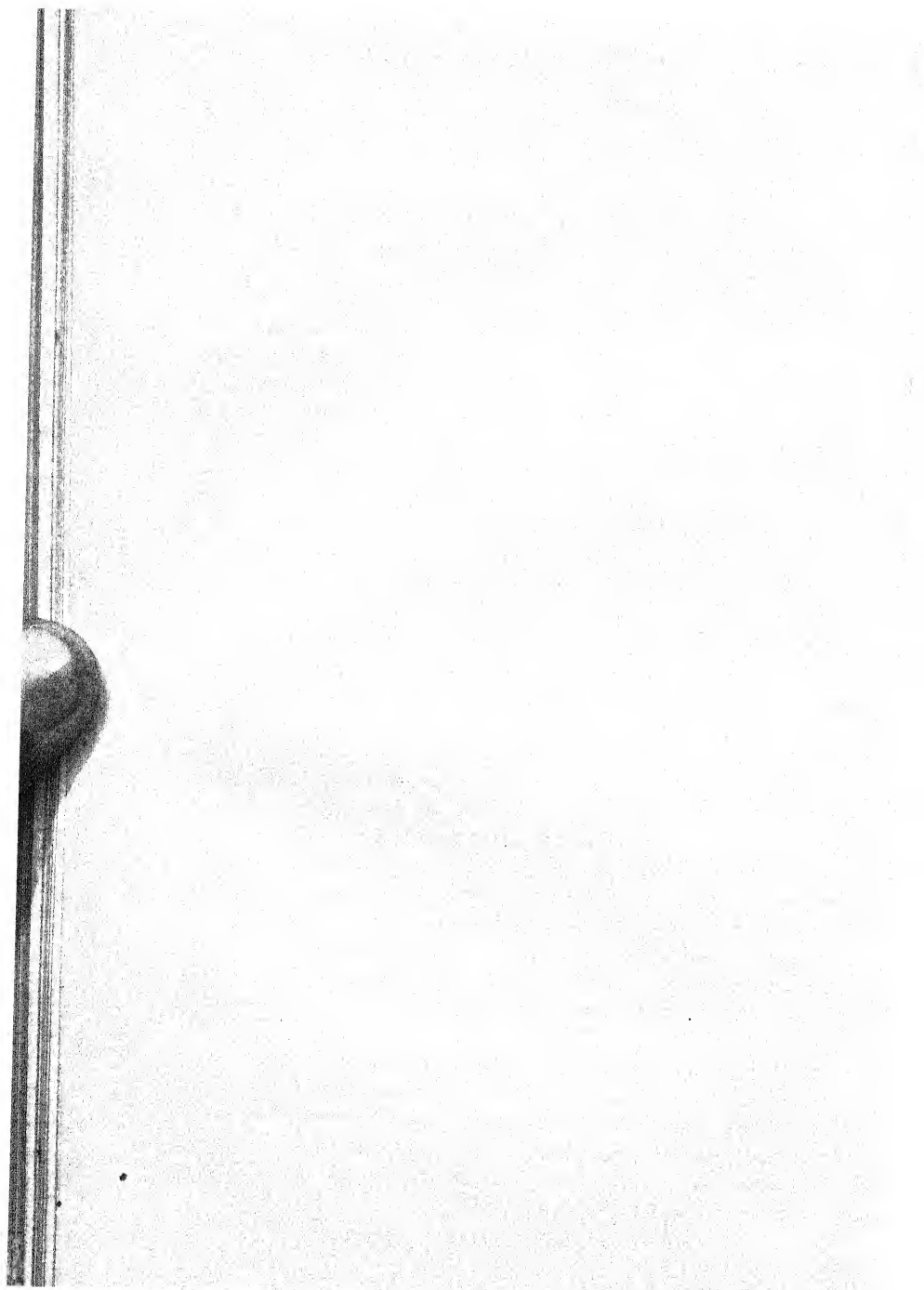
This fact I consider to be indisputable, and it leads at once to a satisfactory explanation of the origin of the deep alluvial deposits of *clays*,

Section of the Spiti Valley

Fig. 8.



1. 1. Former level of alluvium consisting of clasts, sands and pebbles.
2. 2. Former level of Dhaulagiri or Marine formation consisting of pebbles, (Gypsaceous).
3. 3. Present level, outlet of level of the Spiti River from 15,247 feet to Churaga 9,897 feet.
4. 4. Leveling Pass 15,247 feet above the sea and site of Marine excise.



sands, and pebbles now seen in the lower parts of the valley of the Sutledge, to which allusion has been made in the commencement of this paper.

Having now, I trust, satisfactorily showed how the theory proposed, and the facts observable, are in accordance, it only remains, before bringing the subject to a close, to take a brief and rapid glance at the geological formations of the lower hills from Kotgurh to the foot of the mountains.

Taking that station, therefore, again as a starting point, and proceeding towards Simla, we find the formation to consist principally of *mica* and *clay slates*, the one constantly fading into the other, and occurring in frequent alternations.—*Quartz* veins are numerous interspersed in the beds of *mica*, which is sometimes of a soft and scaly nature, containing but little *quartz*,—at others hard and compact, exhibiting little trace of the *mica*.

The mountain of Huttoo, which rises near Nagkunda to the height of 10,656 feet of elevation above the sea, is composed of *mica slate* and *gneiss*, while its summit exhibits some rugged peaks of *granite* jutting upwards through the strata.

The soils which occur from Kotgurh to Simla, are formed chiefly from the decomposition of the *clay* and *mica slates*, with the addition often of a rich vegetable mould.

Descending from Simla towards Subathoo, the primitive formations again yield to the secondary series, exhibiting dark blue *limestones* and many alternations of *slate clay* of different colours; dull-greenish, yellowish, and purple. The latter is also seen as the poste or matrix of a *quartzose breccia* composed of angular fragments of *white quartz*.

Around Subathoo the change becomes the most decided, and the strata are there seen in perfection, consisting of the usual thick beds of *clays* and *marles*, varied with veins of *gypsum*, and resting on a red *marle*, apparently analogous to the red *marle* of England. The strata are here often upheaved nearly to a verticle position, and thick beds of shell *limestone** are found alternating with thinner strata of compact *limestones*, containing castes of bivalve shells, similar to the "*Venus angularis*" of the European strata. Large specimens of *Ostræ* also occur, as well as compact strata, almost entirely composed of small species of the fresh-water genera, *Melania* and *Poludina*.

The presence of these last prove again, beyond a doubt, that fresh water must have occupied eventually the basins in which the marine strata of the secondary series were deposited, and leads to the supposition, that nearly the same causes were instrumental to the formation of that series, as we have just shown to have been conducive to the deposition of the *diluvium* and *alluvium* of the Spiti valley.

* Strata composed almost entirely of shells.

Above these various alternations we find the *oolite*, with its strata of *sandstones*.

Captain P. Gerard of the Invalids, informed me that his brother, the late Dr. Gerard, had once discovered some *Ammonites* in the valley below Subathoo, but although I procured and fractured several of the dark rounded balls in which they often occur, I was not fortunate enough to meet with a specimen of the shell.

About eight miles from Subathoo, in an easterly direction, are rocks of a greyish *limestone*, rising above the *lias* and *oolitic* formation. Immediately underlying this are several strata separated by layers of flints of various forms, and imposed upon these, the *limestone* is first of all stratified and dipping in the same direction, namely, to the S. W.; but the superior portion of the beds rises in shattered and *amorphous* masses, giving a picturesque and beautiful appearance to the range. This *limestone* is quarried and used for economical purposes; it is of two kinds, one being of a pale dirty white or greyish colour, and is the stone from which the *lime* is procured, the other being darker and harder, emitting a strong sulphurous fœtid smell when fractured. This latter is little used, and appears to hold the lighter coloured variety imbedded in it in large masses.

The geological position of this *limestone*, coupled with the remarkable occurrence of layers of rounded and kidney-shaped flints, leads to the supposition, that it may be analogous to the chalk formation of Europe, and if so, it will follow, that the vast ranges of the Himalya, so long supposed to exhibit strata of *gneiss* and *mica schists* alone, will be found to present formations entirely analogous to those of other mountainous countries, even from the *granite* upwards to the *alluvium*, at present in course of deposition and accumulation.

The range on which Subathoo stands, exhibits another example of the effects of what I have termed a *double upheavement*.

Seen from the dāk bungalow of Chamier, the outcrop of the *sandstone* strata is seen dipping towards the N. Eastward, while the same rocks from which they have been torn, dip on the Chamier side of the Glen, towards the S. Westward.

But the N. Easterly dip is not the true direction, for we see again on the opposite side of the same range, that the strata dip likewise to the S. W.

Therefore, the deep valley or glen between the Subathoo and Chamier ranges is the line of disruption of the strata, causing them, as it were, to dip outward on either hand.

From Subathoo downwards to the foot of the hills, the strata belong to the *lias* formation, and gradually fade away until they yield at

length to the sandstones of the tertiary series, in which, at various places from Nahn to Buddee, the fossil exuviae of extinct quadrupeds are found.

This, although but a faint and meagre outline of the geology of the noble ranges of the western Himalaya, is nevertheless sufficient to point out the formations which occur from the base of the mountains to Spiti and Ludāk, and is as much as could be done in a hasty tour over so extensive a field. I shall now, therefore, draw this somewhat lengthy paper to a close, by alluding to the means by which the imbedded exuviae of these formations have been brought to light in these latter days.

I have already stated, that the fall of man is the true period to which the loss of the fossil marine *Mollusca* of the Spiti and Subathoo fields is to be referred.

At the time of their extinction, the secondary strata in which they are imbedded were under course of deposition in horizontal beds, beneath the bosom of a tranquil water, and thus they remained for a period of many years after.

The increasing depravity of the human race, once more called down the vengeance of an offended God, and brought about the second and last grand revolution which the earth has experienced, namely, the Mosaic deluge.

That catastrophe was the means by which the destruction of the large terrestrial *mammalia* of the tertiary strata was effected.

When, therefore, the waters had performed the punitive offices for which they were allowed to transgress their bounds, the mountains of the Himalya were caused, among others, to rise upwards by some vast volcanic or upheaving agent, in order to throw back the ocean from the earth, and gather it again into the place appointed to receive it.

By that upheavement the primary series of the Snowy Range was thrust aloft in torn and ragged spires, while the secondary strata of Spiti and Subathoo then first rose upwards from their horizontal plane to the inclined position which they now possess. Consequent on the uprise of this secondary series was also that of the tertiary beds, and thus we find one single geological revolution to be the sole agent in upheaving the strata of three widely distinct and separate formations.

The Snowy Range or true Himalya, is composed entirely of rocks belonging to the primary series, while to the north and south of it are found resting on its sides, strata of the secondary formationsd isposed at high angles from the horizon, and usually rich in the exuviae of marine and lacustrine *Mollusca*; while ont he southern exposure, forming the base of the hills, and resting on the secondary rocks, occur the tertiary or diluvian beds, which the successful researches of Messrs. Falconer, Durand, and others, in

the present day, have proved to be so rich in the exuvæ of the now extinct forms which once inhabited these countries. Whether this last series occurs also on the northern side, is a point for future investigation ; but as fossil bones are sometimes brought down by native travellers from the Tartar hills beyond Almorah, it would seem that similar phenomena are to be expected there.

The inclined position both of the secondary and tertiary series, is clearly attributable to the outbreak of the primary rocks from beneath or through them and furnishes to the inquiring mind, a sure and beautiful guide by which the period when these vast mountain ranges first rose upwards to adorn our earth, may be satisfactorily and positively determined. The conclusion, therefore, to be drawn from the facts observable in these strata, are all strictly in accordance with the rules of geological reasoning, and I shall therefore now bring the subject to a close, by endeavouring to show the reasoning and existing facts to be in unison, and thus fix the period to which must be referred the stupendous and never-fading monuments of Almighty power, exhibited in the vast upheavements of the Himalyan range.

It is a fact accepted and admitted by geology as indisputable, that where one series of rocks having a horizontal position is found to rest upon another whose strata are inclined, it amounts to positive certainty, that the *deposition* of the *former* took place *subsequent* to the *upheaving* of the *latter* ; and vice versâ, where both series are found, the one resting on the other at high angles with the horizon, that the deposition of the superior strata took place *previous* to the upheavement of those by which they are supported.

Resting on the *primary* rocks of the Snowy Range, we find on either side the strata of the *secondary* series thrown into an inclined position by the upheavement of the *granite* and its usual accompaniments of *gneiss* and *mica slates*, proving by their inclined position, according to the above reasoning, that they were deposited *previous* to the outburst of the former through them.

Again we perceive, that resting on the secondary rocks the tertiary or diluvial strata of the Siwalik range have also an inclined position, consequent on the upheavement of the *primary* and *secondary* series, and therefore, that they too, by a parity of reasoning, were deposited *previous* to the upheavement of the two former.

Now the *tertiary* or *diluvial strata* containing the fossil exuvæ of extinct terrestrial *Mammalia* are clearly attributable to the effects of the *last great revolution* which our earth has undergone, and consequently, we derive from the phenomena, presented to our notice in the various formations of the Himalyan mountains, sure and decided data for determining the period of

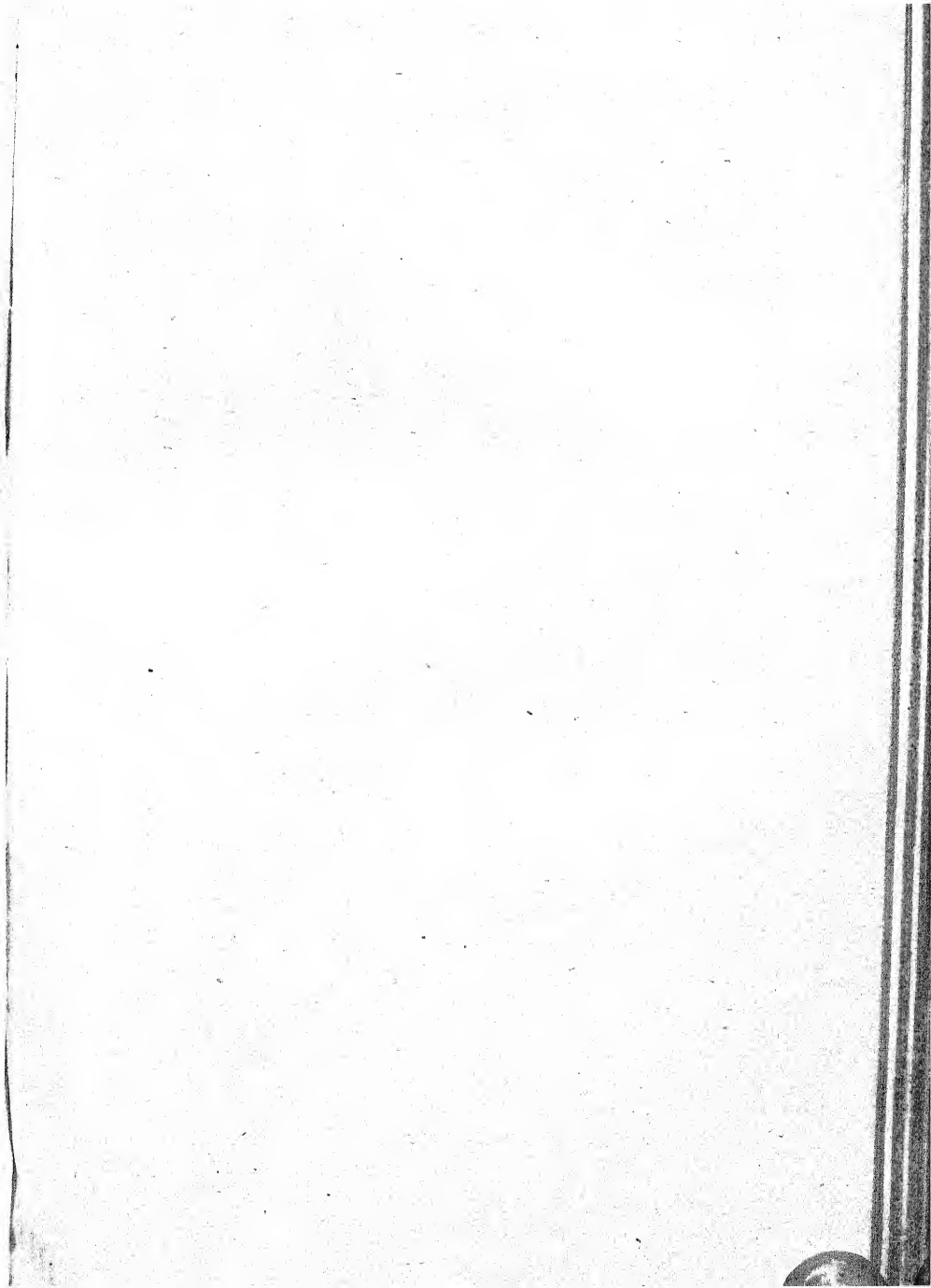
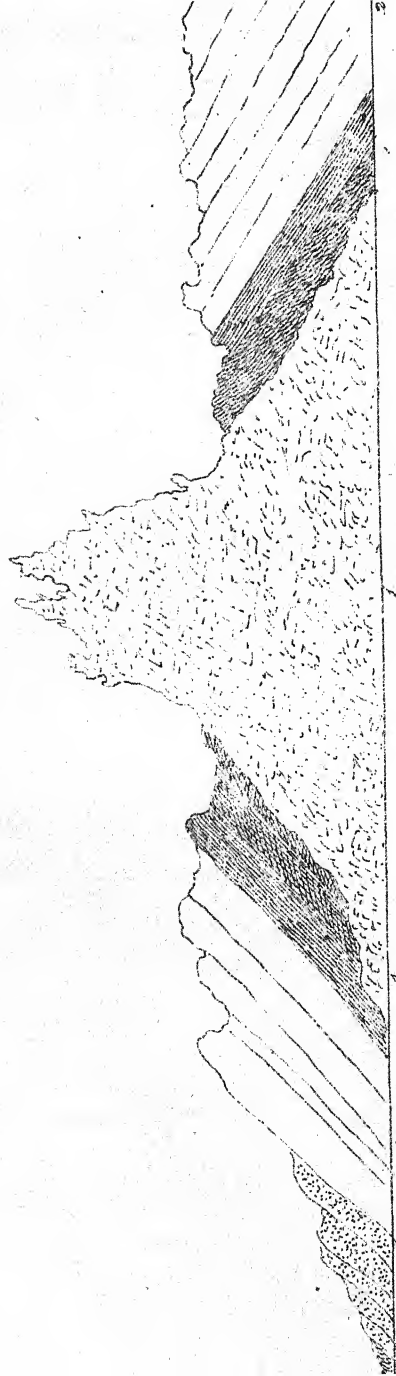


Fig. 9.



Imaginary Section of the Himalayas, showing how the upthrustment of the Primary Strata at 1. 1. 1. would cause the continued position of the Secondary Strata at 2. 2. and the Tertiary deposits at 3. - 4. Alluvium of the Plains.

their first upheavement, which period the facts adduced enable us to assign to the first subsidence of the waters of the *Moasic deluge*.—(See plate) FIG. 9.)

We may suppose, therefore, that when the ocean had been permitted to transgress its bounds, and had again enveloped the earth as in the time before the third creative day, or separation of land and water; and had by its devastating effects fulfilled to the utmost the dreadful doom assigned to all organised creation, the vast and imposing ranges of the Himalya and other mountains were caused to burst upwards by volcanic agents from below, as a means of throwing back the waters from the earth into those bounds appointed to receive them, and also to furnish, by their subsequent accumulations of everlasting snows, a never-failing reservoir from which the rivers of the plains were to be supplied with waters to fertilize the soil; which plains, had the mountains been of inferior elevation, would for ever have remained barren and desolate, except during the prevalence of the periodical monsoon; for it is apparent, that in the hot climates of the eastern world, no snows could have rested upon mountains of a lesser altitude sufficiently long to afford a never-failing supply of waters for irrigation.

Thus, even in the ordering of a mountain range, and the furnishing of wintery snows, is the wisdom and unvarying goodness of the Great First Cause, made manifest to the minds of his inquiring creatures.

To enter at length into the means by which these revolutions took place, and the reasons *why* they were allowed, belongs more properly to a system or theory of geology than to a paper professing to be merely an outline of the geological formations of a limited district.

I shall, therefore, for the present, leave the question in this imperfect form with less regret, since I purpose ere long, (should circumstances befriend me,) to lay before the Society and the Public a theory, which I would fain believe worthy of their most serious and attentive consideration.

CANDAHAR,
19th July, 1840.

On the two wild species of Sheep inhabiting the Himalayan region, with some brief remarks on the craniological character of Ovis, and its allies.—By B. H. HODGSON, Esq. Resident at the Court of Nepal.

The great paucity of unquestionably wild species of the genus *Ovis* now found throughout the habitable globe, is a fact that has been employed to cast a speculative doubt upon my announcement (Catalogue of 1832 and 1838,) of two species in the single region of the Himalaya; and the circumstance of my not having been able therefore to give as full and satisfactory an account of the second species as I long ago gave of the first, (see Journal for September, 1835,) from living specimens, has tended to confirm the above mentioned doubt. I am still unpossessed of similar valuable materials for the illustration of this second species, having never been able to procure the animal alive, nor even to obtain a perfect suite of the spoils of a grown male. I have horns, however, of the mature ram, and skulls and skins of others, varying from one to two years in age; and from these, not inadequate materials, I purpose now to furnish a specific character of the Ammon-like, as well as (for the sake of comparison,) of the Musmon-like animal, together with craniological sketches and details relative to both; such as will suffice, I hope, to place beyond further question, the existence of two entirely distinct, new, and peculiar breeds of Sheep in a state of nature in the Himalaya; where indeed, from the unparalleled elevation and extent of the mountains, it need be no rational matter of surprise that they exist.

Ovis Ammonoides, Nob.—Large wild sheep, with massive strictly trigonal sub-compressed horns, deeper than broad at the base, presenting a flat surface vertically to the front, and cultrated edge beneath, inserted not in contact on the crest of the frontals, remote from the orbits, directed backwards and outwards with a bold circular sweep: the flattened points being again subrecurved outwards and the whole surface covered with numerous heavy complete wrinkles: the forehead flat and broad: the nose scarcely arched, and much attenuated to a fine small muzzle: the ears short, pointed, and striated: the tail short and deer-like, and the limbs fine and elevated: the vesture composed of close, thick, more or less porrect, brittle piles of medial uniform length, concealing a scanty fleece: no beard nor mane: general colour dull slaty

blue, pale on the surface, and more or less tinted with rufous : dorsal ridge dark and embrowned : lips, chin, belly, and insides of limbs near it, dull hoary : limbs externally, below the central flexures, rufescent hoary : snout to base of tail seventy to seventy-two inches : mean height forty-two : head straight to crest of frontals, fourteen : tail with the hair, eight : ears, six : horns, along the curve, forty.

Females smaller, with much smaller, compressed (?) nearly straight horns. Young, with the colours deeper and more sordid. Vulgo, *Banbhéra* and *Bhaäräl*.

Ovis Nāhoör, *Nob.* Medial sized wild Sheep, with moderate, subtrigonal, uncompressed horns, presenting a rounded surface obliquely to the front, and a cultrated edge to the rear, inserted nearly in contact on the crest of the frontals, less remote from the orbits, and directed upwards and outwards with a semicircular sweep ; the rounded points being again recurved backwards and inwards, and the general surface vaguely marked with infrequent rugæ : forehead broad and flat : chaffron arched : muzzle less attenuated : ears erect, short, and striated, and tail short and deer-like, as in the last : vesture or fur also similar, without beard or mane : general colour dull slaty blue, pale on the surface, and more or less tinted there with brownish or fawn : head below, and belly and insides of the limbs near it, yellowish white : face, or nose rather, fronts of the intire limbs, a connecting band along the flanks, whole chest and tip of the tail, black : no disk on the buttocks : their mere margin and that of the tail, pale. Snout to rump sixty inches : mean height thirty-six : head, as before, eleven : tail with the hair seven and three quarters : ears five and three quarters : horns along the curve, twenty-four. Females smaller, with small straightish, suberect, depressed horns, directed upwards chiefly, and with the dark marks on the limbs and chest less extended than in the male ; frequently the chest is wholly unmarked. Young, with the colours deeper and more sordid ; the marks still less extended, and wanting wholly on the chest and flanks. Vulgo *Nāhoör* of the Nepalese.

N. B. Since the Prince of Musignano has published his account of the Musmon, it has become quite evident that our *Nāhoör* cannot be identified with that species ; and though the vaguer accounts of the Asiatic Argali render a like confident judgment in regard to the independence thereon of *Ammonoides* difficult of attainment, yet all

appearances warrant that conclusion. I proceed now to the osteology.

Dimensions of skulls and horns of (1) *Ammonoïdes junior*, (with horns of senior,); and (2) of *Nāhoör*.

horns of senior,); and (2) of <i>Nāhoōr</i> .		I.		II.			
		Ft. In.		Ft. In.			
<i>Skull.</i>	Length from symp. intermax	1	1 $\frac{1}{4}$	0	10 $\frac{1}{2}$		
	to crest frontals, }						
	Greatest height at the crest,...	0	9 $\frac{1}{4}$	0	6 $\frac{1}{4}$		
	Greatest width between ex- }	0	7 $\frac{1}{4}$	0	5 $\frac{1}{4}$		
	ternal margin of orbits, ... }						
	Diameter of orbits,	0	2 $\frac{1}{8}$	0	1 $\frac{9}{16}$		
	Symp intermax to tips of nasals,	0	3 $\frac{1}{16}$	0	2 $\frac{3}{16}$		
Length of nasals,	0	6	0	4			
	Height or length of occiput to	0	0	0	4 $\frac{3}{4}$		
	lower edge of great condyles, }						
<i>Horns.</i>	Length of, along the curve,...	1	10	3	3	1	11
	Basal circuit of,	1	1 $\frac{1}{2}$	1	3 $\frac{1}{4}$	0	10 $\frac{3}{4}$
	Basal depth of,	0	4 $\frac{3}{4}$	0	5 $\frac{7}{8}$	0	3 $\frac{1}{2}$
	Basal width of (across,) ...	0	3 $\frac{1}{4}$	0	3 $\frac{1}{2}$	0	3 $\frac{1}{8}$
	Terminal interval of, ...	1	9	1	8	1	9 $\frac{1}{4}$
	Basal interval of,	0	0 $\frac{3}{4}$	0	0 $\frac{3}{4}$	0	0 $\frac{3}{8}$
	Weight,	7lbs.		20lbs.		7 $\frac{1}{2}$ lbs.	

The above are males, of which the *Nāhoör* is old, and *Ammonoïdes* about eighteen months to two years; but the second pair of the horns given are those of an old male.

The skulls of both have the same general character, possessing alike large flat foreheads, with the frontals half-developed on the postcal plane of the skull, which falls perpendicularly, and nearly at right angles from the antecal plane, whereon the frontals have an extreme breadth exceeding their length by one-third almost. The skulls of both alike have, moreover, the nasals somewhat arched; and half the antecal extent, with all the postcal, of the frontals is bounded by the broad proximate bases of the horns, which, however, extend over the true occiput in neither. The differences observable in the skulls are chiefly, that the orbits are more salient in the *Nāhoör*, and have no semblance before them on the lacrymal and malar bones of that roundish depression which in deer and antelopes holds the cuticular suborbital sinus:

whereas before the less salient orbits of the *Bhārāl*, that depression is palpably marked. Less marked discrepancies between the skulls are found in the greater arch of the nasals in the *Nāhoör*; the more complete concealment of the frontals superiorly and anteriorly by the bases of the horns; and the greater attenuation forwards of the maxillary and intermaxillary bones. In the horns the distinctions between the two species are very palpable; those of the *Banbhéra* being more massive, strictly trigonal, with a flat surface forwards, far more heavily wrinkled, and much more completely curved towards a circle, whence it results that the bases are thrown more off the forehead, and that the direction at first is parallel to the plane of the face. In the *Nāhoör*, on the other hand, the horns though ample, are neither as massive nor as long as in the *Banbhéra*. So far from being a perfect trigonal, the anterior half of them almost is broadly convexed: their surface is very much smoother; their divergency greater; their bend towards the circle far less complete, and consequently their bases lie more over the forehead, and they have for some way upwards, a direction much before the plane of the face. In the *Nāhoör*, the horns towards their tips are rounded or cylindrical, and are decidedly reverted out of the line of the first curve, backwards and inwards. In the other species, or *Bhārāl*, the characteristics of the horns in these respects are compression to flatness, and a less decided retroversion of the extremities, leaving the actual points directed forwards and outwards.

I shall conclude this paper with a general remark, which is, that the great depth or extent of the postcal plane of the skull, (comprehending half the frontal and all the parietal bones,) and the acute angle it forms with the antecal plane* in the genus *Ovis*, will be found to be characters of more permanency and moment in separating this genus and *Capra* from the nearest adjacent groups of Ruminants, than most of the diagnostics now employed; and that we have Cuvier's example in regard to the Bovine group to authorise our adoption of the additional and so much required mark as now suggested for the Caprine or rather Ovine. I subjoin an outline of the typical Antelopine and Cervine form of skull on one hand, and that of the normal form in *Ovis* and *Capra* on the other; and those only who would reject an essential part of

* The consequences of these peculiarities in the low position of the condyles of the lower jaw, and of the foramen magnum, are also marked.

the now generally recognised diagnostics of the groups of the *Bovidæ*, (Taurus, Bubalus, &c.) or who are ignorant of the shadowy nature of the existing marks of discrimination between Antelope, Ovis, and Capra, will, I apprehend, refuse to adopt the now suggested more enlarged application of Cuvier's principles. Either those principles are false, or this larger application of them is as legitimate as it is requisite. On these principles, (as on others,) *Cervus* and *Ovis* represent the extremes, and *Antelopa* and *Capra* the means: but there is a regular graduation from *Cervus* to *Antelopa*, from it to *Capra*, and from it again to *Ovis*; in such wise, however, that the two former fall naturally into one great group, and the two latter into another, *Cervus* and *Ovis* being the typical forms. And I may add as a proof how useful the new diagnosis now proposed is, and how harmonious in practice with other and admitted criteria, that, measured by this standard, our *Hemitragus* (the *Jharal*) is as clearly a caprine form as Ogilvy's *Kemas* (the *Ghoral*) is an antelopine one. Thus too the affinity of the Musks and Muntjacs to *Cervus*, however apparently anomalous they seem to be, is rendered palpably evident, and the soundness of our diagnosis consequently further corroborated.

With regard to *Ovis* and *Capra*, inter-se, Cuvier's 'forehead concave' for the latter, and 'forehead convex' for the former genus, are clearly erroneous marks; but those sometime since suggested by me, of 'males odorous,' and 'males not odorous,' as respectively characteristic of *Capra* and *Ovis*, I find confirmed by every day's experience: nor is this discriminative sign dependent, as supposed, on season in any degree, nor even on age after the animal has reached about four months, so soon is the odour developed in *Capra*.

Nipal, March, 1841.

H. B. HODGSON.

Explanation of the Illustrations.

I.—1. 2. Front view of the horns and skulls of our two species of Sheep, to prove their distinctness.

II.—Sketch of *Ovis Nahoor*.

III.—Lateral outline view of two skulls, designed to exhibit the characteristic form in *Cervus* and *Antelope* (1) on the one hand, and in *Ovis* and *Capra* (2) on the other: and I may add, that the animals having been females, and not specially selected, the distinction contended for is thus shown to be peculiarly valid.

Plate I.

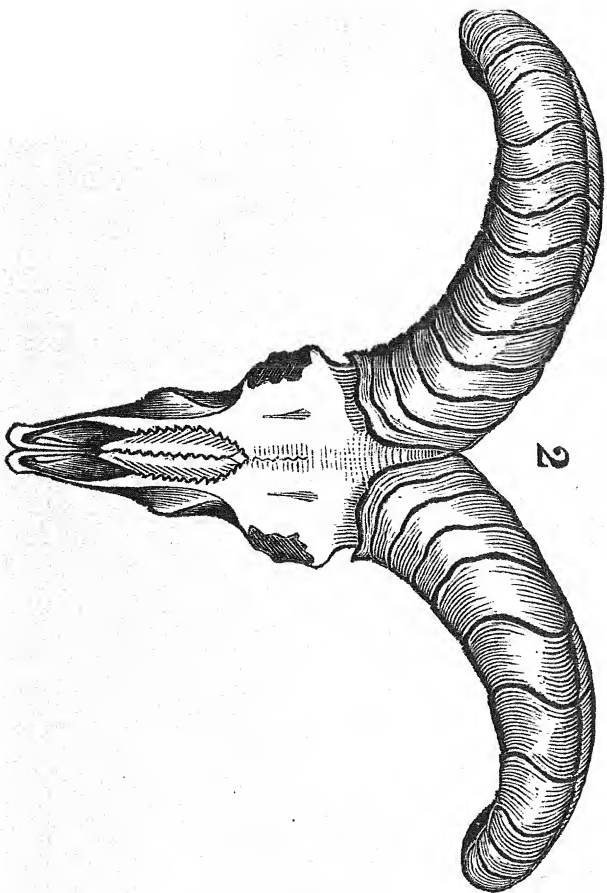
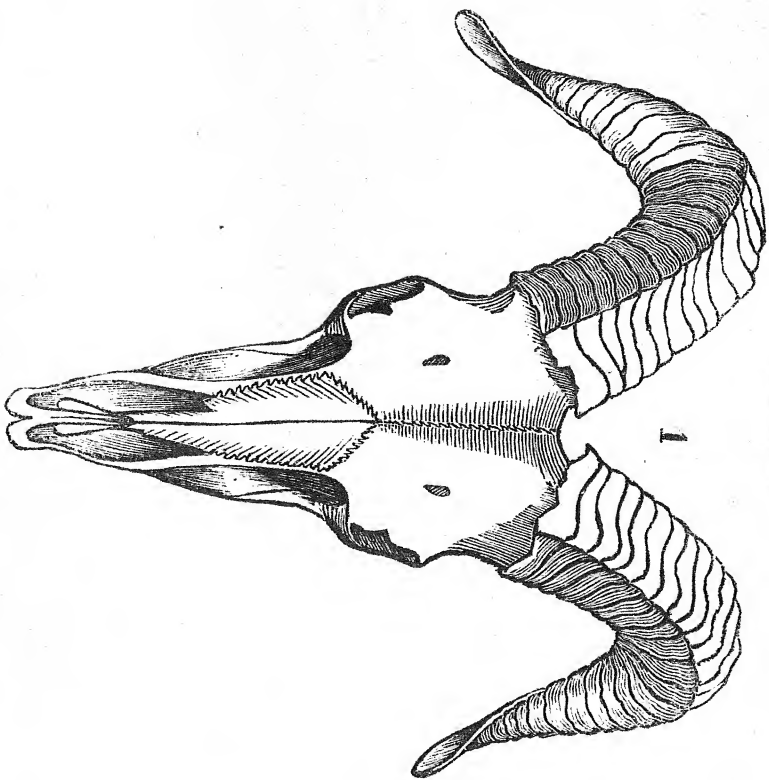


Plate II.

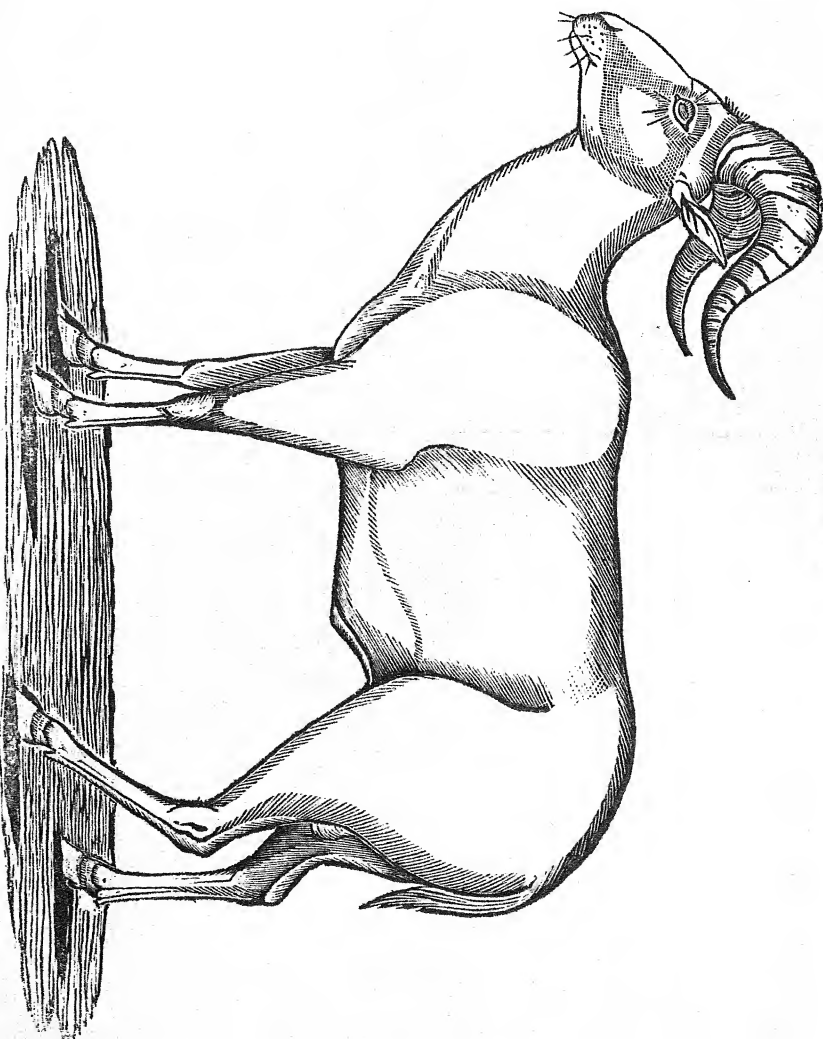
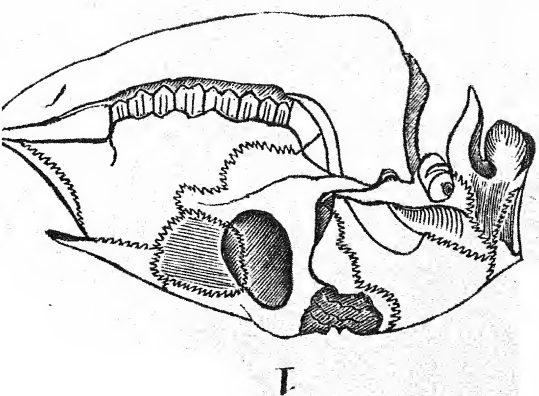
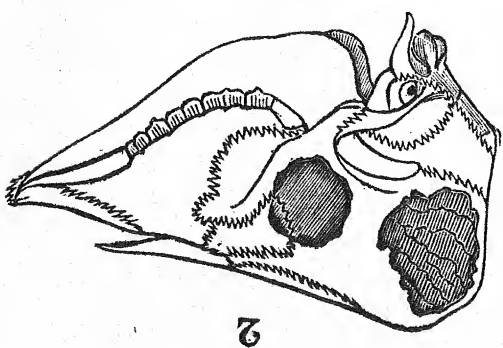


Plate III.





On the Laws and Law-books of the Armenians. By JOHANNES
AVDALL, ESQ., M. A. S. &c.

[This paper, Mr. Avdall informs me, was drawn up at the instance of Mr. J. C. C. Sutherland, who having referred to the author for information on the recognized sources of Armenian law, was answered by the production of this erudite paper. It contains a very clear exposition of a subject wholly unknown to general students, and mooted points of historical as well as legal interest.]



An account of the first enactment of laws, instituted in Armenia, by the Armenian king Valarsaces, a descendant of the Arsacidæ, is recorded in the historical work of Moses Chorenensis, a Latin translation of which, with the Armenian text, was published at London, in the year 1735, by the two brothers, William and George Whiston. This Armenian historian, of venerable antiquity, enumerates in a successive and proper order, the rules and regulations enacted by Valarsaces, both for the guidance of the inmates of the royal palace, and of the citizens in general. “Եւ օրէնս իմն հաստատէ ՚ի տան թա-

գաւորութեան իւրոյ . և ժամն որոշէ ելևմտից և խորհրդոց և խրախճանութեանց և զբօսանաց . . . Հրաման տայ քաղաքացեաց մարդկան արգոյ և պատիւ լինել քան զգեղջկաց , և գեղջկաց պատուել զքաղաքացիս որպէս զելշանս . և քաղաքացեացն մի՛ կարի առ գեղջկօքն պերճանալ , այլ եղբայրաբար վարիլ վասն բարեկարգութեան և աննախանձօտ կենաց , որ է շինութեան և խաղաղութեան և կենաց պատճառք , և որ ինչ նման այսոցիկ : ” Թ.

7. “Legésque quasdam de aulâ suâ posuit, quibus exeundi et intrandi, consiliorum, et epularum atque oblectamentarum tempora distribuit. Ampliorem dignitatem atque honorem civibus, quàm rusticis haberi jubet ; Rusticis, ut cives, tanquam principes, colant, imperat ; Civibus, ne se erga rusticos superbè gerant, sed fraternam inter se vitam degant, honestè institutam, et ab invidiâ remotam, unde tranquillitas vitæ et securitas, aliâque ejusdem generis sint oritura.” *Lib. ii. Cap. vii.*—From the foregoing facts it is evident that Valarsaces had

given a code of laws for the guidance of the Armenians. To have orally delivered these laws, without committing them to writing, was certainly unbecoming the enlightened and civilised reign of Valarsaces. But, of all the laws enacted by this king, one is repeatedly quoted by Moses of Chorene, which shall be mentioned below.

Laws enacted during the reign of the Arsacidæ, first by Valarsaces the Parthian, and afterwards by others.

In the foregoing chapter Moses Chorenensis writes thus about Valarsaces:—“**Եւ քանզի բազում ունէր ուստերս , պատշաճ վարկաւ իջամենեցուն առ իւր կալ ՚ի Սրժբին (ուր բնակէր յայնժամ ինքն Վաղարշակ .) վասն որոյ առաքէ զնոսա բնակել ՚ի կողմանս Հաշտենից , և ՚ի ձորն նորին սահմանեալ , որ է արտաքոյ Տարօնոյ , ՚ի նոսա [Թողլով զշէնս ամենայն հանդերձ յաւելուածով մտից առանձինն , և ոռճկաց կարգելոց յարքունուստ , և միայն զառաջին որդին՝ որ կոչէր Արշակ , պահէ առ իւր ՚ի համար Թագաւորութեան : Եւ եղև այս յայնմ հետէ և առ յապայ օրէնք ՚ի մէջ Արշակունեաց , միոյ որդւոյ բնակել ընդ արքայի , փոխանորդ լինել Թագաւորութեանն . և այլ ուստերաց և դստերաց գնալ ՚ի կողմանս Հաշտենից՝ յազգին ժառանգութիւն :**”

“Caeterum quum multos filios haberet, parum utile esse ratus, ut cuncti ad Nisibim manerent, in provinciam eos Hastensem dimisit, et ad Zoram, quae fides ejus contingit, trans Taronem sitam; illisque universa ea oppida attribuit et stipendia insuper de gazâ regiâ singulis statuit; at ex filiis suis, natu solùm maximum, Arsaces ei nomen erat, imperio destinatum. Deinceps inde consuetudo Arsacidarum fuit, ut unus de filiis cum rege habitaret, regni successor futurus, caeterique filii ac filiae in regionem Hastensem ad possessiones suas abirent.” Artavazd the First, moreover, conferred on the Armenian princes, possession of the provinces of Aliovit and Arberany.

“ Սա Ժառանգեցուցանէ զեղբարս իւր և զքորս ՚ի գաւառս Աղիովտի և Առբերանոյ , Թողլով ՚ի նոսա զմասն արքունի՝ որ ՚ի շէնս այնմ գաւառաց , հանգերձ առանձին մօից և ռոճկաց , ըստ օրինակի ազգականացն՝ որ ՚ի կողմանս Հաշտենից . որպէս զի լինել նոցա պատուականագոյն և առաւել Թագաւորազնն քան զայնս Արշակունիս . միայն օրինադրէ՝ ոչ կեալ յԱյրարատ ՚ի բնակութիւն արքայի : ” Թ .

21. “ Is fratribus suis ac sororibus possessiones in provinciis Aluhotensi et Arberanensi dedit, regeúmque eis vectigal attribuit, quod ex provinciae ejus oppidis redibat, propriumque ipsis stipendium insuper statuit, de more cognatorum, qui in regione Hastensi habitabant, ut honoratiores essent, atque adeò ad regeam dignitatem propiùs accederent quam Arsacidae caeteri ; lege tantùm sanxit, ne Araratam, quae erat regia habitatio, incolerent.”—*Lib. II. Cap. XXI.*—Sánátrúk also sent the daughters of Abgarus to that part of the country, about which Moses of Chorene says :—“ Զամենայն զաւակ տանն

Աբգարու մաշեաց սրով բաց յաղջկանց , զորս եհան ՚ի քաղաքէն (Եդեսիոյ) բնակել ՚ի կողմանս Հաշտենից : ” Թ . 32. “ Sed omnem Abgari stirpem, praeter puellas, ferro sustulit, quas, ex oppido eductas, in provinciâ Hasteniâ collocavit.”

Lib. II. Cap. XXXII.—Following this example, Artavazd the Second, sent the other princes to those provinces. “ Հալածէ յԱյրարատոյ զամենայն եղբարս իւր ՚ի գաւառս Աղիովտայ և Առբերանոյ , զի մի՛ բնակեսցեն յԱյրարատ ՚ի

կալուածս արքայի , բայց միայն զՏիրան (զեղբայր իւր) պահէ փոխանորդ իւր . զի որդի ոչ գոյր նք : Թ .

58. “ Artavazdes omnes fratres suos ab Araratâ in Aluotam et Arberaniam provincias pepulit, ut ne Araratam ac possessiones regias incolerent. Tiranum modò secum retinuit, regni successorem, cum sibi non esset filius.” *Lib. II. Cap. LVIII.*—The royal descendants having permanently settled in these parts of the country, began to

increase and multiply, and after the lapse of several years, the number of their offspring became very considerable, so much so, that an appeal was made by them to Tiran the First, touching the insufficiency of the provinces allotted for their habitation, to contain such an increased and increasing number of inhabitants. Moses of Chorene says:

“Եւ եկեալ առ նա կանխագոյն իւրոյ ազգին Արշակունեաց որ էին ՚ի կողմանս Հաշտենից, ասեն. ընդարձակեն մեզ զԺառանգութիւնս զի նեղ է, քանզի բազմացաք. և նա հրամայէ ոմանց ՚ի նոցանէ երթալ ՚ի գաւառն Աղիովտի և Առբերանոյ. իսկ սոցա առաւել ևս բոլորք կալեալ առ արքայի, [Ժէ առաւելագոյն նեղ է մեզ, ոչինչ ունկնդիր լինի Տիրան, այլ հաստատեալ վճիռ՝ ոչ այլ ժառանգութիւն տալ նոցա, բայց զոր ունին հաւասար տրոհել յինքեանս. զոր բաժանեալ ըստ մարդաթուի՝ գտաւ պակաս ժառանգութիւն բնակողացն Հաշտենից. վասն որոյ բազումք ՚ի նոցանէ եկեալ ՚ի գաւառն Աղիովտի և Առբերանոյ:” Թ. 59.

Caeterum brevi tempore interjecto ad eum gens sua Arsacidarum venit, quae Hastenios tractus havitavit, dicens, “profer nobis haereditatis fines, quae arctae sunt, cum simus admodum multiplicati.” Ille vero eorum nonnullos in Aluotam et Arberaniam provincias migrare iussit; cumque ii ad regem acrius clamarent, regionem eam ipsos nimis coartare, Tiranus, nihil annuens, Edicto sanxit daturum se eis haereditatem aliam nullam; quam tenebant, aequaliter inter se dividerent. Quam cum pro hominum numero partiti essent, incolis minimè sufficere Hastenia reperta est, ac propterea multi eorum in provincias Aluotam et Arberaniam commigrarunt.” *Lib. II. Cap. LIX.*—Immediately after the death of Khosrow the Great, when Ardashir, king of Persia, made an aggression on Armenia and conquered the country, he extended his royal munificence and support to these descendants of the Armenian kings. For the said venerated historian says: “Իսկ Արտաշրի գեղեցկապէս յարդարեալ զաշխարհս

Հայոց՝ ի կարգ առաջին հաստատէր, նա և զԱր-
շակունիսն (զարքայորդիսն) զմեկուսացեալսն ի Թա-
գէն և յԱրարատն բնակելոյ՝ կարգէ ի նոյն տեղիս
մտիւք և ռոճկօք որպէս էինն :” Է. 74. Tum Artasires
Armeniae terram egregiè ornavit, atque in antiquum statum restituit.
Arsacidæ ab regno et domicilio Araratensi pulsos, in eundem locum
reduxit, et eadem eis, quæ priùs habuerant, stipendia statuit.” *Lib.*
II. *Cap.* LXXIV.

Of the Satraps of Armenia.

History also tells us, that there were specific laws extant for the guidance of the Satraps of Armenia. Faustus of Byzantium, who wrote an Armenian history in the fourth century, alludes to the existence of certain laws, which seem to have obtained in Armenia only during the reign of Khosrow the Little. “Posterior to this,” says Faustus, “the Persians were incessant in waging wars with the king Khosrow. Laws were, in consequence, enacted by the king for the guidance of the Armenian satraps, grandees, chiefs, and lords, whose number was very considerable, and on whom it was made obligatory to remain near to their royal master, and none of them were permitted to accompany the expedition against the king of Persia. This measure was adopted by Khosrow, from a want of confidence in the sincerity of the attachment of the nobles of his court. The terror of the disloyalty of Databi had seized upon his mind, and he apprehended the occurrence of a similar event in his own country.” *Faustus. Lib.* III. *Cap.* VIII.

Laws enacted during the reign of the Bagratidæ.

Of the laws enacted during the days of the Bagratian kings, no record has been preserved in the annals of the Armenian historians. But, from ancient Armenian manuscripts, found at Lemberg or Leopold, a city in Poland, it is ascertained that the Armenians, who emigrated in the eleventh century from the thickly populated city of Ani,* and other provinces of Armenia to that part of Europe, had carried with them the code of laws by which they were guided in their own

* Ani was a most magnificent and populous city in Armenia towards the close of the tenth century, and contained one thousand and one churches ! See my *History of Armenia*, vol. II. p. 92. It is nothing now, but a heap of ruins.

country. This code of laws was translated into Latin in the year 1548, by order of Sigismund the First, king of Poland. It is greatly to be regretted that not a single copy of this Latin translation of the Armenian code of laws has made its way to British India. It is, however, consolatory to learn, that this translation is to this day preserved in the library of the Armenian College at Venice. Sigismund writes thus in the preface to that code of laws: "Although we have to this day sheltered and protected the Polish Armenians, our subjects, under their own Armenian privileges and laws, by which our predecessors had acknowledged and governed them, but on the occurrence of dissensions and disputes between them and the citizens, it was thought necessary to have that law-book of theirs, which was written in the Armenian language, and which was only understood by themselves, translated by them into Latin, and presented to us in that form, so that every cause of suspicion and collusion should be removed, and that we should, by the help of the members of our council, make judicious inquiries into its contents, and, by a slight alteration, confirm the same." After writing thus far, he mentions the name of Johannes, the Bagratian king, and cites his mandate in the following manner: "Johannes, by the grace of God, king of Armenia, during the days of his auspicious reign enjoined, not to open courts of judicature on Sundays—not to borrow money—not to prefer claims against debtors; and made other similar enactments for the observance of Sundays." After this he adds: "It is enjoined by the Armenian king Theodosius, (perhaps Ashot,) of happy and blessed memory, and other orthodox Armenian kings and princes, to render justice and equity to all—to cities, towns, villages," *et hoc genus omne*. These quotations are corroborative of the existence of laws and law-books in Armenia, during the reign of the Bagratidæ.

Of the succession of Kings.

Although after the subversion of the kingdom of the Bagratidæ, we meet with a specimen of the law of succession in the commencement of the code of Mechithar Ghosh,* yet it is evident that this law was in

* Mechithar Ghosh flourished in Armenia towards the close of the twelfth, and the beginning of the thirteenth century. Besides his code of laws, he is known to be the author of several other valuable works in the Armenian language. *Ghosh* is the cor-

force in Armenia during the reign of the Bagratian kings, with some slight variations. In the days of the Arsacidæ the crown devolved from son to son in a lineal succession; but the law of the Bagratidæ confers the right of succession upon brothers. There are also some other laws, of which I shall furnish the reader with an extract: "Although," says this legislator, "the crown by right devolves upon the first-born, yet the most eminent for his wisdom is to succeed to the throne. So long as the king's brothers survive him, his sons are debarred from a succession to the throne. But, on the extinction or demise of the brothers, then the crown devolves upon the king's sons. Should the king leave a daughter surviving him, she is to be invested with the title of nobility, and is, together with her husband, entitled to one-half of a share of a brother. And, on the demise of kings, if there be a son from the son, and a son from the daughter, the son's son is to succeed to the throne, but not the daughter's. And so long as there may be descendants of the son, the daughter's children are debarred from succession, at which any attempt made by the latter is unlawful and unjust. For, it was in this manner that our king Abgarus enacted laws for the succession to the throne of Persia. And the patriarch Noah apportioned to the sons and the daughter, the regions of the southward, as women also rule over those parts."—Then the legislator describes the manner in which the succession is to descend when there be only a daughter, but no son surviving the king. Or, if there be no heir to the king, then the right of succession devolves on his kinsmen, one of whom only is to reside at the royal palace near the king, and the rest are to be domiciled at a distance, according to the custom prevalent among the former kings of Armenia. All this is written by Mechithar Ghosh, in the commencement of the second chapter of his code of laws. By the last quotation, the legislator means to allude to that usage of the kings of the Arsacidæ, of which mention was made above. The law of succession was not, however, kept inviolate during the reign of the Bagratidæ, among whom there were

ruption of the Persian word *خواجه* corresponding with *քաթա* or *քաթը* or vulgò *քաթի* in Armenian. This appellative cognomen was added to the Christian name of the Armenian legislator, in consequence of his having very little or no beard. By this distinguishing appellation he is invariably mentioned throughout the works of his cotemporaneous writers, and in the page of our national history.

found some pretenders and upstarts, who created disturbances by disputing the right of succession. The collision of Atshot with his brother Johannes, is a remarkable instance of this dispute.* But, during the reign of the Arsacidæ, the whole of the royal descendants, with the exception of Sánátrúk, adhered to this law of succession.

Some other items of the Laws of the Bagratidæ.

Taxes are alluded to in the second chapter of the code of Mechithar Ghosh, who treats of the royal courts of judicature, and of those subordinate thereto: "Kings and princes," says this legislator, "ought justly to impose taxes on lands and nations, and not to exact more than what is tolerated or allowed by immemorial usages. They will have to render an account of their stewardship to the great God. They were appointed for the preservation and welfare of the country, but not to entail ruin and misery upon the people placed under their government. The imposition of taxes ought to be in the following manner: one-fifth of the produce of cultivated lands is to be given to the state. Lands, gardens, and orchards, purchased by the people, are not to be subjected to this tribute. Watermills and houses are in like manner to enjoy this exemption. The inhabitants are to be taxed for the trade in which they are respectively engaged, and the commodities which they offer for sale. Christians are considered exempt from a poll tax, which is only to be imposed upon unbelievers. Irrigated lands are subjected to a tribute of one-fifth of their produce, and enfranchised or quit lands are subject to the payment of tithes. Because the right of kings and princes extends only to earth, but not to water, enfranchised lands, orchards, and gardens, are also exempt from taxation. In like manner, of the seven days in the week, one is to be devoted to the royal service. To demand from labourers more than this, is a great injustice. No specific tax is to be imposed upon oxen, besides that of one-fifth alluded to above. A pound of butter is only to be levied upon each cow. Pasture-grounds are exempt from the tax which is imposed upon cattle that graze therein. The sheep are to be tithed in their lambkins, which can be exchanged with the sheep *ad libitum*. Horses, mules, and asses, are not to be taxed, because by the

* Vide my History of Armenia, vol. II. p. 109.

help of these animals essential services are rendered to the government of the country."

From the same chapter of the code of Mechithar Ghosh, we shall quote what relates to the administration and law of precedence of the ancients. "It is unjust in princes to impose a tax upon believers, because the unbelievers are alone to be taxed. It is proper to exact tribute from the latter, but not from the former, as it is done by the Georgians to those placed under their subjection. When a tract of land is granted by the crown to an Armenian nobleman,—if a fort be raised on it by the latter in accordance with the royal consent, or if a village be constructed thereon, or if ruined buildings be repaired thereon,—then, and in that case, the same tract of land is to devolve on him and his heirs in perpetuity. The land so granted is by no means to be alienated from him without a very serious and heinous offence. And, after the death of the person or persons on whom that land is conferred, the gift is to devolve on his, her, or their, descendants by order of the king. In like manner, nobles are to be next to princes, according to the seniority or priority of the latter, and citizens and peasants ought to be subordinate to nobles.—Forests cleared, and ruined places repaired or rebuilt, are to be the undisputed and inalienable property of the enterprising persons at whose expense the works were performed, and are to devolve on their children in perpetuity after their death. On the construction of a city or fort, should there be a deficiency of money in the public treasury, it is incumbent on the people to render their general support towards the completion of the building. Citizens are to enjoy the honor of precedence to villagers, and inhabitants of villages should precede in rank the farmers and husbandmen. This law of precedence is, in like manner, to obtain among the denizens of forts and villages. These have been the usual and invariable practices among the ancient kings of Armenia." The concluding portion of this quotation alludes to the usages prevalent in our country during the reign of Valarsaces, as stated above.

Courts of Judicature, and Codes of Laws in Armenia.

In our national history mention is made of the institution of courts of judicature by Valarsaces, during the days of the Arsacidæ, as it appears from the testimony of Moses of Chorene, while speaking of the

public acts of this monarch. “**Իրաւարարս ՚ի տան արքունի, իրաւարարս ՚ի քաղաքս և յաւանս :** Բ. 7: “*Judices in aulâ regiâ, judices in oppidis villisque statuit.*” *Lib. II. Cap. VII.* Where there are judges, there must of necessity be courts of judicature, in which judges and arbiters hear causes, and administer justice by the employment of officers and subordinates, without whom judicial affairs cannot be properly managed and conducted. But, that there were actually courts of judicature in existence in Armenia, we have conclusive and satisfactory evidence in the work of that ancient historian. **Գիւղից և գաւառաց, ևս և իւրաքանչիւր տանց առանձնականութեց, և հանուրց հակառակութեանց և դաշանց, այժմ առ մեզ գտանին անբաւ զըրուցաց մատենք, մանաւանդ որ ՚ի սեպհական ազատութեն (նախարարութեն) պայազատուի :** Խ. 2: “*Quibus adhuc devicis at provinciis, atque etiam rebus sigillatim domesticis, publicisque controversiis, ac foederibus, scripta extant apud nos innumera historiarum volumina, ac praecipuè dum successio mansit libera.*” *Lib. I. Cap. II.* It is evident that such codes of laws and instruments regarding which disputes and differences might have naturally arisen, by the lapse of several years, among heirs, coheirs, and legatees, were carefully kept in courts of judicature, conformably to the order of the government of the country. This has been the common and invariable practice of civilized nations, in all ages and in all countries.

We have also incontrovertible proofs of the existence of law-books in Armenia during the reign of the Bagratidæ, in the Latin translation of the code compiled and prepared under the auspices of the Armenian king, Johannes the Bagratiar, of which mention was made above. The classification of the chapters of this code is preceded by this sentence :—“ The Armenian kings lay down this model of justice for the guidance of their judges.”—Then follow, in separate chapters, laws respecting the adjustment of disputes arising from wills—laws enacted for the settlement of differences among married parties—and laws intended for the correction of offenders and the punishment of criminals.

In the face of all these evidences, one cannot but be greatly astonished in reading the introduction to the code of Mechithar Ghosh, where-

in he frequently alludes to a total absence of laws and law-books among the Armenians, and to the consequent necessity of his collecting data, and embodying them in the form of a code of laws! In the second chapter of his law-book, the heading of which is, "Why were we disposed to compile this book, or what incentives induced us to resolve on framing this code?" Mechithar Ghosh furnishes the reader with a statement of his reasons for so doing, of which the following is an extract:—"That we have often been accused not only by unbelievers, but by Christians also, of a total absence of law-books, based upon the principles of evangelical laws. That lest, from the non-existence of a written law, the Armenians should apply or appeal to unbelievers for justice. That many, on various occasions, ignorantly distort the true meaning of laws, and it is for their information and correction that we were induced to compose this code of laws. Not content with this alone, we caused this code to be placed in courts of judicature, as a record intended for occasional and necessary reference. That being destitute of written laws, our predecessors were unable to make references, but, on the removal of this want, we shall now avail ourselves of this record, and be able to afford a proof to unbelievers of the existence of written laws amongst us, by which they will be silenced, and obliged to desist from heaping on us accusations for the apparent want of a code. We were for a very considerable time subjected to the keenest reproaches of our countrymen and strangers for the absence of a law-book, and their censures proved as a spur to us in undertaking the preparation of a code of laws....I was also seized with astonishment at the apathetic indifference displayed by our ancestors in not supplying this desideratum."

These remarks were written by Mechithar Ghosh, towards the close of the twelfth century, at which period, as stated above, he flourished in Armenia in the character of an Armenian lawgiver, and erudite author. But, as the numerous Armenian families that first quitted Armenia emigrated to Poland in the middle of the eleventh century, it is very probable that these emigrants carried with them their own law-book, which it was impossible for Mechithar Ghosh to meet with in Armenia. The Armenian colonists in Poland being in possession of a law-book of their own, were guided by it in all their civil and judicial affairs, as stated above. Yet, upon all this, considering the laws al-

luded to by him, relative to the prerogatives of kings and the rights of princes, we are led to conclude that Mechithar Ghosh was at least possessed of some fragments of the laws of the kings of the ancient Bagratidæ and Arsacidæ, otherwise he would have candidly declared that the code was entirely his own production. This carries with it its own improbability. And it is not injudicious to adopt this conclusion from the perusal of the second chapter of the prefatory observations of his law-book, in which he says:—"This string of laws will perhaps be considered an object of ridicule by those in whose hands it may chance to fall! They will assimilate us in their mind's eye to those who, in a fit of delusion, dream of kingdoms and of royal splendour and glory; but no sooner they are awakened from their illusive and enchanting dreams, than they see nothing but the mere shadow of what their heated imagination had portrayed in glowing colours! But, let them remember that I am not ignorant of the vanity and transitoriness of all earthly kingdoms! Of this we have a most singular and striking proof in the rise, progress, and annihilation of our own kingdom. The past has vanished for ever—the present is a mere tantalising nonentity—the future I can scarcely hope to see! Yet, these distressing circumstances and melancholy reflections will not be permitted to cool my ardor in prosecuting the task of framing a complete code of laws, conformable to the wants and present state of the nation, from the conviction, that the utility of my production will be generally acknowledged and duly appreciated. In attempting to publish and promulgate this work, I must crave the kind indulgence of unbiassed observers; and, in so doing, I stand fully prepared to be visited with the censures of hasty and fastidious critics, for such errors and imperfections as may be found in this production of mine. Yet I still entertain a hope, that they will consider me worthy of credit for good intentions, though they may not be disposed to extend to me their pardon for the defects of my work." From these observations of Mechithar Ghosh it is to be inferred, that the laws contained in his book were not *bonâ fidé* his sole production, but a compilation from those framed by ancient Armenian law-givers. In preparing this article on the laws and law-books of the Armenians, I have availed myself of Inchichian's "*Antiquities of Armenia*," a work published at Venice in 1835, and replete with deep research and

most valuable information. If the Mechitharistic Society* of Venice be disposed to publish a correct edition of the code of Mechithar Ghosh, and of the book of laws prepared under the auspices of the Armenian king, Johannes the Bagratian,—authentic copies of which are preserved in the extensive library of that learned body,—they will certainly confer a very heavy obligation on their countrymen generally, but more particularly on the Armenians located within the pale of the government of British India. An approved and unexceptionable edition of these two statute-books of the Armenians, cannot but be most servicable to the judges of the Sudder Dewany Adawlut, who will be entirely guided by them as by an unerring criterion in their decisions on causes and questions arising from hereditary gifts and testamentary bequests of the Armenians residing under the jurisdiction of the Mofussil courts. But in the absence of printed Armenian law-books, questions of succession to property, in cases in which the litigants were known to be Armenians, have been invariably referred in writing by the judges of the Company's courts to such of the Armenian bishops as happened to sojourn or itinerate in this part of British India, during the period of their triennial or septennial episcopal visitation, which they performed in accordance with the written and acknowledged authority with which they were respectively invested by the pontificate of Etchmiatchin,† near Erevan, in the province of Ararat, the archbishoprick‡ of Julpha in Ispahan, and the patriarchate of Jerusalem,§

* This veteran Society was established in the year 1717, and its members have been pre-eminently successful in the revival and cultivation of the classical literature of Armenia, by the publication of numerous philosophical, philological, and scientific works of sterling merit. The members of this Society lead a strictly monastic life. The following lines are extracted from the life of its zealous and patriotic founder :—

“ Մենաւանս այս ըստ բոլորին
Շինեալ եղև 'ի փառս Փրկչին :
Յաբբայու թեան Սեբաստացւոյ
Մին թարայ վարդապետին :”

“ Fuit hoc monasterium totum tempore Mechithar Petri ex Sebaste I. Abbatis extractum. A. D. 1740.”

† 'Ի կաթողիկոսարանէն նոյն էջմիածնի :

‡ Յառաջնորդարանէն Ձուլայու :

§ 'Ի Պատրիարքարանէն Երուսաղէմի :

to which each or any of them individually belonged. Sometimes, in the absence of Armenian bishops, the officiating Clergy attached to the Armenian church of Calcutta have also been consulted on questions of inheritance, or testamentary bequests. The exposition of the Armenian law or usage, furnished by these episcopal and clerical dignitaries of the Armenian church, in accordance with the specific queries put to them, has, almost in all instances, guided the judges of the Company's courts, either in determining similar questions pending *sub judice*, or in pronouncing their decisions in cases of the above mentioned description. The Company's courts, so far as my information extends, pursue the practice sanctioned by the precedents alluded to above.

In connection with the subject of Armenian laws and law-books, I think it necessary to add, that in June 1838, I was requested by my highly esteemed and deeply lamented friend, Mr. James Prinsep, to pass my opinion on a certain Armenian code of laws in manuscript, which accompanied his letter, for my perusal and consideration. I cheerfully undertook the task intrusted to me, and instantly put him in possession of my opinion in a letter, of which the following is a copy :—

TO JAMES PRINSEP, ESQ.

MY DEAR MR. PRINSEP,

I have received your note of yesterday's date, together with a manuscript volume in the Armenian language, and hasten to put you in possession of my candid opinion on the same.

The book in question is a code of laws, both civil and ecclesiastical, written or transcribed in the Haican era 1135, corresponding with the year of our Lord 1686, partly by a priest named Alexianus, and partly by a bishop named Jacob, native of Ghrim, and pupil of another bishop named George, of the see of Ezinka. The transcription thereof was made at the desire of another bishop named Thomas, and inscribed to Stephanus, the supreme patriarch of the Aluans. The work is based on Mosaic laws, and the materials of which it is composed are derived from the Old and New Testaments, and from other ancient records.

Mechithar Ghosh, who flourished in Armenia between the close of the twelfth and the beginning of the thirteenth century, and who is eminently distinguished in the page of our national history for his unrivalled attainments, is known to have been the author or

originator of a code of Armenian laws, which was then generally used in the courts of judicature of our country. History also tells us that another code of laws was in existence in Armenia, so far back as the year of Christ 1046, written or prepared under the auspices of the Armenian king, Johannes Bagratian. The latter has been in general use among the numerous Armenian population of Poland, where a transcript of it is preserved, with a Latin translation; but the text or original work is not to be found. As neither of these law-books has found its way to India, I am unable to say whether the volume you have sent me is a transcript of the one or the other, for the name of the author or legislator has unfortunately not been inserted therein. I am, however, inclined to think it to be a compilation from both, but cannot take it upon myself to say, whether it is one of established legal reputation in Armenia. It is greatly to be regretted that the code of Mechithar Ghosh has never been printed or published to this day. This, under existing circumstances, is certainly a very serious evil to the Armenians living under the jurisdiction of our Zillah courts.

The following is a translation of a portion of the Chapter on Inheritance:—

“ Chapter CIV.—Of the division of Property.

“ Conformably to the rule of division, property must be equally divided in the following manner: that is to say, the whole of the property to be considered as one drachma, and the drachma as six oboli. If there be a son and a daughter in the family, the property must be thus divided: that is to say, two and a half oboli to the brother, two and a half oboli to the sister, and one obolus to the mother. But, if there be two sisters, and both of them married, the two sisters are to be looked upon in the light of one brother. Two and a half oboli to be given to the brother, two and a half oboli to the two sisters, and one obolus to the mother.”

From this it will appear, that the wife or mother is entitled to one-sixth of the property bequeathed by the father or husband. This custom or usage, so far as my information extends, does to this day obtain among the Armenians residing in the various parts of Persia and Turkey. It is difficult for me to ascertain whether the Armenians living under the rule of Russia,* are equally guided or influenced by this usage.

* A code of laws, bearing the affix of the imperial *fat*, was concocted and published in 1836, for the guidance of the Armenians living in Ararat, one of the provinces of Armenia which is now under the sway of Russia. A copy of this code of

Herewith I return you the manuscript volume, with the contents of which I have already been made acquainted, by the kindness of its former owner.* Another copy of this work, though not so elegantly written, was in the possession of one† of the Armenian priests of Calcutta; but in consequence of his death, it was, together with his other books, sent to his son at Ispahan in January last. Should you require an English translation of any other portion of the work, I shall feel most happy to furnish you with it.‡

Believe me to be,

Your's very truly,

CALCUTTA,
26th June, 1838.

JOHANNES AVDALL.

laws in manuscript having been sent to me from Madras, I instantly put it into the press, and published a sufficient number of copies thereof for the numerous Armenians living in different parts of British India. The contents of this code are, however, inapplicable and scarcely of any use or benefit to my expatriated countrymen, scattered throughout this portion of the globe. Driven as we are from our country by Moslem despotism and unrelenting persecution—bereft as we are of our national glory and independence—wandering as we are on the surface of the globe like the scattered children of Israel, but partially domiciled here, under the fostering and paternal care of the British Government, I trust I shall not be taxed with presumption in expressing a wish, that a string of laws, well adapted and suited to the circumstances and general condition of the Armenians settled in this country, framed and concocted by the wisdom of the Legislative Council, be passed and promulgated by the Supreme Government of British India, with the view of promoting and securing the welfare of the children of their adoption. In asking this boon, I rest assured that it will be conceded to us by the illustrious and philanthropic head of our government.

* The former owner of this law-book was the late Right Rev. Hárúthéun Várdápiet Աբգահան Զարուհիւն Վարդապետ of the fraternity of the Armenian Convent of Julpha in Ispahan. In the year 1824, while residing at Sydadab with his brother, the late patriotic Manásacán Vardon, the Rev. gentleman was applied to in writing by Mr. G. C. Master, first judge of the Provincial Court for the division of Dacca, to state his opinion on a certain question of inheritance, arising from the will of a certain opulent Armenian inhabitant of that place. In complying with Mr. Master's request, this dignitary of the Armenian church availed himself of the contents of this very law-book. His opinion on the subject is justly and appropriately prefaced by these words—"All laws of justice, either civil or ecclesiastical, in all Christian nations, have their origin from the Holy Scriptures." The judges, I am credibly informed, were guided by his opinion in pronouncing their decisions. Hence, it is evident, that the book in question was considered by the judges as a sufficient authority. On the death of Hárúthéun Várdápiet, the book alluded to became the property of his brother, Mr. Manásacán Vardon, on whose demise it devolved on his eldest son, and is now in the possession of his youngest son, Mr. S. M. Vardon.

† The late Rev. Ter Marcar Ter Carapiet, Հանգուցեալ Աբգահրոն Տէր Մարգար Տէր Կարապետեան formerly vicar of the Armenian church of Calcutta, of happy and blessed memory.

‡ The utility of piecemeal extracts from these manuscript Armenian law-books, will be temporary and confined to a few only. As several of the Armenian residents in the Mofussil, have a large and extensive property in lands and talúks, would it not be advisable for them to adopt measures for printing at the Armenian press in Venice the code of Mechithar Ghosh, and the law-book of the Armenian king, Johannes Bagration? Let them come forward and supply the *sine quâ non*, and the long-desired object will be speedily and satisfactorily consummated.

On Tabular Returns of the N. W. Frontier Trade with Afghanistan.

[Profiting by the scope and character of this Journal, and following the system of the Society after which it is named, the Editor has not hesitated in publishing the following Tables, and the remarks upon them, as containing most valuable notice of a subject interesting to all in India. The information compendiously given in the above, was the result of private perquisitions, made at the instance of the writer of this note: it may be relied on as strictly accurate. The allusion to disadvantages opposed to traders from Cabool is only made, in order to show how great must the contrary advantage be, and how strong the impulse to trade, when, (as the writer believes to be the case,) they have now been removed by recent arrangements.]



EXPORTS.

British Manufactures and Island Produce.

The statement (No. 1,) embracing the trade of the year 1840, (from January to December,) in British manufactures and Island produce cannot, it is to be regretted, be pronounced thoroughly accurate, inasmuch as it is derived from data which is presumed to be imperfect. However, the quantity of each staple therein exhibited as having been exported to Cabool across our North-west Frontier, during the period under review, is, there is every reason to believe, by no means exaggerated; on the contrary, it may be said to fall far short of what actually found its way to the Northern marts, via Delhi, which is the great *entrepôt* of the extensive commerce of our North-western Provinces and Central Asia.

The correctness of the staples of trade given in the statement can be vouched for, and it will be observed, that cloths form the chief. Of the several descriptions of linen the most prized and sought after, is long-cloth, (*Luttah*,) the unbleached being preferred to the bleached; the Cabool merchants having discovered that our method of bleaching rots the thread, and abstracts a year's wear at least from the cloth; besides it enables them the more readily to dye it blue, their favourite colour.

Of all the export staples, British linen is said to give the greatest return, yielding a nett profit of nearly 100 per cent. on the outlay,

and to meet with the most ready sale, the merchants from Khiva, Bokhara, Khorassan, Samarcand, Lodauk, &c. &c. buying it up with avidity.

Our broad cloths, too, are eagerly sought after, (*sombre* colours are preferred to gay,) and immense quantities are said to be exported from Bombay. It is only the coarser quality that is inquired after here. The same remark applies to Birmingham and Sheffield ware, cutlery, &c. which is very much admired and prized; especially when contrasted with the miserable wares of Russia, specimens of which, when contrasted with the rudest workmanship of the Delhi artificers, have shown the comparison to be greatly to the prejudice of the former.

The next article in point of importance is metal, (lead, copper &c. the former in pigs, and the latter in sheets,) and of this it need only be said, that the demand for the Northern marts is greater than the supply here, *i. e.* the surplus supply—the home consumption being enormous.

Island produce, of which the several kinds of spices compose the principal export staple, (black pepper is the chief item,) will always exercise a very important influence on the Cabool trade; for, although not strictly coming under the term “necessary,” the customs and habits of Asiatics render the consumption of Island produce, spices, beetlenuts, pigments, &c. a matter of course.

The trade, as will be seen in Island produce, has been tolerably brisk during the past year; but it would have been considerably more so, were it not for customs’ restrictions.

Almost all articles of Island produce are subjected to port duties when imported seaward into Calcutta, and therefore, agreeably to the liberal principle allowed by Government, ought not again to be taxed any where within the Company’s territories. This, however, is not, and cannot be done, inasmuch as most of the produce of the Islands is also liable to the payment of inland customs’ duties; that is, they (*vide margin**) are borne on the tariff, which regulates the levy of duty in the inland customs’ houses.

* Spices, beetlenuts, logwood, pepper, long pepper and its roots, (called pipal-moor,) sandal-wood, senna, camphor, benjamin, red earth, red lead.

A Cabool merchant, (to give an example,) purchases at Calcutta 10 maunds of black pepper, which he is told is sea-imported, and therefore not liable to further interference any where within the Company's territories. He brings this pepper to the North-west frontier line of customs unaccompanied by a *rowannah*, when, as a matter of course, it is seized. The owner urges that he purchased it at Calcutta as a sea-import, and the customs' officer demands proof, which is not forthcoming. The consequence is, that the goods are detained, and the case is reported to the Sudder office, which is often distant a hundred miles from the scene of action. The merchant defending the case urges the same plea, and the native appraiser, who cannot possibly know the difference, is asked his opinion as to whether the article is sea-imported, or country produce. In nine cases out of ten he declares it to be the latter, when the custom collector desirous of discriminating between zeal to Government and justice to the trader, determines upon sending samples of the goods to the custom master at Calcutta: meanwhile, the merchant is told that his property must remain under attachment, or he must deposit a sufficient sum of money to meet a demand for single duty. This latter alternative he gladly accepts, considering any sacrifice better than further detention, which usually swells out to fifteen or twenty days.

The samples are, in due course, submitted to the English appraiser in Calcutta, who, possibly knowing nothing of country produce, or at least of the particular produce in question, pronounces the samples to be sea-imported; consequently, the inland custom collector resolves to release the pepper; but the owner is no where to be found, and his money remains in deposit for three months, when, according to the rules of the department, it reverts to Government.

Subsequently the owner on his return trip to the provinces calls to know the fate of his money, and he is told that although the pepper was proved to have been sea-imported, the duty was carried to credit, as he did not claim it within the prescribed period of three months.

The above will shew, without further comments, how materially this branch of commerce is retarded, (and without help) by the frontier customs.*

* I have reason to believe, that this inconvenience is in course of remedy.

Country Produce.

Statement No. 3, exhibits this section of the Cabool trade during the year 1840, and as it is compiled from authentic documents, there can be no doubt of its accuracy. Want of time has not allowed of a comparison with the exports of previous years, but there are the most ample grounds for asserting, that the past has more than quadrupled in quantity and value the exports of former years.

Statements No. 5 and 7, shew the exports during January and February 1841, which have also been abstracted from the custom-house registers. A marked improvement will be observed in these, especially as regards the chief staples, cloths and shoes, more than double of the former, and quintuple of the latter, having been exported during these two months than during the whole of last year. Indigo, which also occupies a prominent station, I have reserved for particular notice hereafter.

Statement No. 10, gives the exports of the past month, (March 1841); this is not included with Nos. 5 and 7, with the view of mentioning that measures were taken in February last at all the custom posts stretching along the outer frontier line, which extends from Kalsie in the Deyrah Dhoon to Goverdhun on the Eastern boundary of the Bhurtpore territory, for the registry not only of all country, but British and foreign produce exported to, and imported from, Cabool; and that, therefore, means are obtained for the faithful record of the operations of each month, and in each article.

From this statement it will be seen, that 92,401 pieces of cloth (linen, silk, and brocades,) valued at Rs. 1,82,064 were carried across the frontier in March, which was considerably more than any other period, and gives evidence of the increasing demand for the productions of British India.

Cloth being the principal staple of commerce in country produce, it may be necessary to state what descriptions of cloth are most desired. The most valuable, and consequently the least in quantity, are kimkhaubs and doputtas, (coloured,) both of which are manufactured at Benares, and yield unusually large returns on re-sale at Cabool. The largest in quantity, but least in value, are Furruckabad chintzes, and Dooab muslins, ghingams, doosooties, and garhas, also Dinapore muslins. These latter are preferred to the indigenous cloth of the

north, as possessing a finer and stronger texture, being mostly woven with English and country thread.

Country shoes, which it will be perceived are exported in large quantities, are manufactured chiefly about, and exported entirely from, Delhi. Indigo, regarding which a distinct notice was reserved, possesses the distinguishing feature of being the only article of trade contained in the statements, which is not conveyed directly by the Cabool (*Vilati*) merchants. It is in the first instance consigned by the Delhi merchants to Amritsir, from whence it finds its way to Cabool. That which is exported across our customs' frontier, is raised at Koorjah in the Alligurrh district; but the quantity stated in the statements, is perhaps not one-half of what will be found in the Cabool market, as large quantities have within the last few years been grown in the protected Seikh states* which are beyond our line, and from thence imported into the Punjab, and countries contiguous to it.

There was at first room for doubting the fact, that indigo really found a market at Cabool to the extent alleged, and close inquiry was therefore instituted of the Cabool merchants; the result has proved the correctness of the original information, and the removal of all doubt on this important question may truly be deemed of paramount interest, both to the European who embarks his capital in raising indigo, and the exporter, who will be, in a great measure, rendered independent of the fluctuations of the European market, by the wide field of enterprize opened to him in the vast countries of the north; where, as I have before observed, the beautiful and permanent dye of indigo will always supersede every other, from its being the favourite colour, and applied to the commonest wearing apparel. However, this refers more to a prospective, than a present benefit.

Indigo produced by a European, whether from its superior quality, the result of superior machinery and larger outlay, or enhanced price, cannot for a time compete with the inferior and cheaper material produced by the native manufacturer, for reasons obvious to those

* Munny Majra in Sirhind, a small principality among the states, produces it most extensively, and of the best quality.

acquainted with the purposes to which indigo is applied,* and the low ebb to which the monetary relations of the mass of the people of the north were reduced, immediately previous to the influx of British enterprise and British capital. When the operation of these powerful, and hitherto never-failing propellants to prosperity shall have come into full play, it may reasonably be hoped that articles, whether indigenous to Europe or Asia, of European manufacture, will be consumed in preference to those which are produced from the rude and primitive machinery of India.

The other articles of export in country produce, with the exception of *Gotah kenarre*, scarcely merit particular mention, as they are so trifling; but it may be reasonably expected, that as the productions of British India become better known, they will be appreciated, therefore more extensively consumed. Already the use of *lac* is being understood, and I am aware of several merchants having carried samples of it with them, that they might regulate the supply by the demand.

Gotah kenaree, (gold and silver tissues,) will, I am assured, in time be extensively sought after. The chief—possibly only—places of manufacture are Lucknow and Delhi; the latter especially.† It is impossible to ascertain precisely the quantity exported, as from its great value, every expedient is resorted to, and it is said successfully, to smuggle it.

As pertinent to this subject, it is worthy of remark, that in 1837, several camel loads of spurious lace were stopped, which were crossing the line, packed in bundles bearing the manufacturing mark of *Moscow*. It had been brought from Cabool, and had been sent to the

* There are yet other reasons which militate against the purchase by Afghans of indigo manufactured in the European method, the principal of which is the compact pressure given by us to the article. This renders necessary the employment of machinery to grind down the dye before the colouring matter can be properly extracted, whereas the friable, uncompact nature of the indigenously manufactured article, admits of its ready solution in water.

† Benares has also, I think, an extensive manufacture of this article.

provinces, with the view of ascertaining whether sale would be obtained for it; since that period no attempt has since been made to force the manufactures of Russia into our markets.

IMPORTS.

Previously to the opening of the Cabool trade by the result of recent political events, exports were greatly disproportioned to imports; the dangers of the route, and other obvious causes, rendering it most unsafe to convey foreign and valuable articles, which could tempt the cupidity of the lawless hordes, inhabiting the countries through which the route lay. The imports were, in consequence, converted into specie, and not, as now, paid for in kind: so that the advantage all lay on the side of Cabool.

In the statements of import trade, only such articles as yield a duty to the British Government are shewn. Of these, the chief is assafoetida, which always meets with ready sale in our provinces. There is perhaps no country in the world where assafoetida is more commonly used than in Hindoostan.

Saffron is in less common use; the price placing it beyond the means of any but the rich, and a preference being given to that which is brought from Calcutta, imported from the Persian Gulph in Arab ships.

Besides the duty-paying staples, fruits, sarsaparilla, salopmisry, lapis lazuli, medicinal drugs, opium, and churru, comprize the import trade of Cabool. In the margin* is appended a note, shew-

* Raisins,	1774	Camel loads.
Pistachio Nuts,	182	ditto.
Monukkas,	592	ditto.
Khobaunies,	90	ditto.
Pears,	108	ditto.
Pomegranates,	605	ditto.
Walnuts,	14	ditto.
Prunes,	71	ditto.
Almonds,	379	ditto.
Plumbs,	66	ditto.
Grapes,	105	ditto.
Figs,	14	ditto.

4,000

Fruit is only imported in the cold season.

ing the number of camel loads of fruit, amounting to 4,000, which crossed our frontier from November 1838 to April 1839. The operations of this period are shewn in preference to any other, as being the least favourable, in consequence of the military preparations in progress at that period, by which the trade was partially checked; so that there was a falling

off of nearly one-fourth in the imports of previous years, and one-tenth of those of 1840.

Mooltan, Bahawalpore, and Soorutgurh, and Bhutneer, (in the Beka-neer states,) mark the route followed by the *Kafilas* before they enter the British possessions. From Bhutneer they come to Sirsa, in the Bhutty territory; whence travelling by Ranea, Hansie, and Rhotuck, they enter Delhi, and then diverge to the several marts of the provinces.

The reason assigned for the *Kafilas* congregating at Delhi is, that by doing so, they avoid the heavy duties imposed at every customs' *chowkey*, which they would have to pass in their progress through Beka-neer, Lohanee, Kanounie, and other foreign states.

The nature of these duties will be judged from the subjoined memorandum.

At Soorutghur, per camel load of fruit, pays a tax of .. 12 annas.

At Bhutneer, the same, 12 annas.

Total, Rs. 1 8

This amount of duty is paid by the Cabool merchants to the Beka-neer state, and it is computed that in good average years a revenue of rupees 12,000 is derived from this source; which, at 12 annas per camel load, would shew the average number of camel loads of fruit imported every season into our territories to be 16,000. This tax is levied without distinction as to the quality of the fruit, all paying alike, and when two camels are lightly laden, from their being young or weak, they pay the tax of one proper camel load.

At Naheir, in the Bhekaneer states, an additional duty is levied of, per camel load, Rs. 1 5 0

And at Buhadera, also in the Beka-neer states, a further duty of, per camel load, 2 10 0

Making a Total of Rs. 3 15 0

which, added to the duties levied at Lohanee, Kanounie, &c. averaging 1-8 per camel load, shew an aggregate of rupees 5-7 per camel load, which the merchants would have to pay in addition to the tax paid at Soorutgurh and Bhutneer, were they to enter our territories by any other route than Sirsa and Delhi. Of course, no reference is made to the route running through the Khyber Pass, the Punjab, Ferozepore and Loodianah, as the Cabool merchants would at all risks avoid it.

It now remains to offer a few brief general observations, premising as to the character of the Cabool merchants, that they are remarkable for probity and straight-forward dealing, combined with caution and great tact in the art of buying and selling, and that it is so high in the provinces, that credit to any amount is given to them without hesitation. Indeed a striking resemblance in this respect may be traced between them and that remarkable tribe the Brinjarruhs.

After disposing of most of their import wares at Delhi, the merchants proceed to the lower provinces, furnished with bills of exchange from the Delhi merchants on their agents at Cawnpore, Allahabad, Benares, Calcutta, &c. and having laid in a stock of goods suited to the Cabool markets they return to Delhi, and forming a *Kafilā*, retrace their way back to Cabool by the same route* they come. They use no other carriage but camels until they reach Allahabad, at which place they leave them, and convey any goods they may have purchased in the lower provinces on hackeries.

Mention was not made in the proper place, that besides the trade carried on *bona fide* by the Cabool merchants, which the statements appended are intended to shew, immense quantities of every kind of goods obtainable at Delhi are consigned to Cabool by the Delhi merchants, through their agents at Amritsir, and advantage is taken of convoys proceeding to Cabool to despatch large consignments.

As a proof of the growing importance of the Cabool trade, it may be mentioned, that an insurance office (Native) has been opened in Delhi, which will assure goods to any amount and value to Cabool.

The regeneration of the town of Sirsa has greatly contributed to the convenience and security of the Cabool merchants. The opening of the navigation of the Indus, and the predominance given thereby to Ferozepore, has certainly abstracted in some measure from the importance of Sirsa, as a grand emporium of traffic. Yet it will always be deemed a valuable *point d'appui* to the northern trade, especially as the superintendent of the Bhutty territory can protect the traders from exactions and vexatious delays on the part of our subordinate customs' officers.

* They usually make trips in the year one and a half.

In conclusion it may be noticed, that the Cabool merchants being totally ignorant of our laws, especially customs, are shamefully imposed upon by a set of law people, who, under the pretence of instructing them how to avoid rendering themselves amenable to our courts, prey upon them in every possible way. It would therefore be very desirable, if the authorities at Delhi were required to direct attention to the interests of the northern trade.*

I am happy to inform you, that since I last wrote, an enterprising merchant of Delhi, who was formerly an inhabitant of Peshawur and removed to Hindostan with Governor Elphinstone's mission, despatched a small consignment of goods (vide margin) to Yarkund via

Subathoo and Lodauk, with the view of ascertaining whether our exports could not be thrown into China by way of Yarkund, which is I believe situated directly on the borders of it. He seems to be

very sanguine of success; as he considers that the superiority of our manufactures will always secure for them the preference over those of Russia, with which alone the Yarkund market is now supplied. In a few days I will submit a statement of trade for April, in which I hope to be able to exhibit three or four new exports. Until October or November, however, the trade altogether will be very slack.

* Attention has, I believe, been directed to this point.



No. 1.

Statement of Goods exported from and via Delhi to Cabool, during the year 1840, the same being British Manufactured and Sea Imported via Calcutta.

Names of Articles.	Quantity.	Estimated value.	Remarks.
BRITISH MANUFACTURES, &c.		<i>Rupees.</i>	This Statement has been drawn up from information supplied by the Cabool Merchants' Agents in Delhi, and may, possibly, not be correct.
Linen cloth, white,	30,000 pieces,	3,15,000	
Chintzes,	25,000 ditto,	80,000	
Velvets,	400 ditto,	60,000	
Broad cloths,	not known,	50,000	
Birmingham & Sheffield-ware cutlery, &c.	ditto,	45,000	
Glass-ware,	ditto,	15,000	
Gun flints,	ditto,	10,000	
Lead, Pewter, &c.	ditto,	1,20,000	
Copper,	ditto,	25,000	
Alum,	ditto,	20,000	
White lead,	100 maunds,	8,000	
Total, ... ..	...	7,48,000
SEA IMPORTATIONS.			
Species, Drugs, &c.	3,300 maunds,	70,000	
Logwood,	2,000 ditto,	20,000	
Beetle nuts,	500	10,000	
Brimstone,	500 ditto,	8,000	
Quicksilver,	30 ditto,	5,000	
Red lead,	200 ditto,	15,000	
Vermillion,	50 ditto,	6,000	
Sandal wood,	200 ditto,	3,000	
Red earth,	200 ditto,	1,000	
Total, ... ..	...	1,38,000
Grand total, ... ..	...	8,86,000

No. 2.

Statement of Goods imported from Cabool across the N. W. Frontier, during the year 1840. The same being liable to the Custom Tax.

Names of Articles.	Quantity.			Value.			Amount of Duty.		
	MDS.	S.	CH.	RS.	AS.	P.	RS.	AS.	P.
Assafotida, ..	1,652	38	2	1,44,971	3	9	14,496	15	5
Zeerah, Cummin, ..	1,346	16	8	10,275	5	6	770	11	3
Zaffron, Saffron, ..		33	2½	995	5	0	99	8	6
Gum-mastic, ..	6	31	0	671	6	0	50	6	4
Sumbhoor or Furs...	118½		pairs.	224	11	3	11	4	0
Total,				1,57,137	15	11	15,423	13	6

No. 3.

Statement of Goods exported to Cabool across the N. W. Frontier, during the year 1840. The same being Customary produce, and liable to the Custom Tax.

Names of Articles.	Quantity.	Value.			Amount of Duty.		
		RS.	AS.	P.	RS.	AS.	P.
Cloth,	26,826 pieces	45,525	1	0	1,372	0	8
Cocoanut oil,	20 maunds	280	0	0	20	15	11
Kimkhab or Bro- cades,	1,633 pieces	39,037	12	0	2,886	5	4
Verdigrease,	70 seers 6 chks.	36	8	3	3	10	5
Hides,	387	218	0	0	10	14	5
Gotah or lace,	595 tolahs	1,312	5	0	65	9	10
Leather Stockings, ..	100 pairs	300	0	0	15	0	0
Amber,	43 tolahs	129	0	0	9	10	9
Cocoanuts,	2,300	92	0	0	4	9	8
Embroidered Goods, ..	64 pieces	785	2	0	58	14	1
Wax Candles, ..	2 mds. 10 seers	180	0	0	18	0	0
Iron vessels,	6 mds.	75	0	0	7	8	0
Beetle nuts, country, ..	26 mds. 35 seers	215	0	0	16	1	11
Sugar, brown,	2 mds. 12½ seers	21	8	0	1	2	6
Large Hooka snakes, ..	2	20	0	0	1	8	0
Till (Oil seeds,) ..	31 mds. 20 seers	63	0	0	4	11	7
Shoes,	474 pairs	1,340	13	0	78	1	6
Mirzapoor Carpets, ..	247	827	0	9	62	0	6
Old Brass,	2 mds. 10 seers	101	4	0	10	2	0
Iron,	41 mds. 30 seers	43	10	0	4	5	10
Ballchud, Spikenard, ..	1 maund	10	0	0	0	12	0
Red Lead, country, ..	30 seers	12	0	0	1	3	2
Vermillion, do.	6 seers	36	0	0	3	9	8
Nutmegs, do.	6 seers	36	0	0	3	9	8
Red Sandal-wood, ..	11 seers	1	10	0	0	1	11
Tuj, (Cassia,)	23½ seers	20	9	0	0	8	3
Sulphur,	12½ seers	12	8	0	1	4	0
Doosooty Cloth, ..	2 seers	1	2	0	0	1	5
Indigo,	1,989m. 19s. 8c.	2,18,116	9	11	10,905	13	9
Gum,	19 mds. 20 seers	136	8	0	10	3	10
Total,		3,08,985	14	11	15,578	8	7
Total Imports and Exports,		4,66,123	14	10	31,007	6	1

These two Statements are derived from the Custom House Registers, and can therefore be relied on.

No. 4.

Statement of Goods imported from Cabool across the N. W. Frontier, during the month of January 1841, the same being liable to the Custom Tax.

Names of Articles.	Quantity.	Value.	Amount of Duty.
		<i>Rs. As. Ps.</i>	<i>Rs. As. Ps.</i>
Assafoetida, ...	700 mds. 9 seers.	39,361 2 0	3,996 0 0
Sumbhoor or Furs,	180 pairs, ...	133 10 0	16 10 11
Black zeerah, Ni- gella, ... }	70 mds. 23 seers.	2,752 14 0	217 5 7
Guns, ...	2, ...	20 0 0	4 0 0
Total, ...		42,267 10 0	4,234 0 6

No. 5.

Statement of Goods, exported to Cabool across the N. W. Frontier, during the month of January 1841, the same being Country produce, and liable to the Custom Tax.

Names of Articles.	Quantity.	Value.	Amount of Duty.
		<i>Rs. As. Ps.</i>	<i>Rs. As. Ps.</i>
Cloths, ...	987 pieces, ...	1,076 8 10	26 14 8
Kimkhab or Bro- cades, ... }	51½ ditto, ...	496 12 10	37 4 3
Lac, shell and stick,	20 seers, ...	4 0 0	0 3 2
Iron goods, ...	9 mds. 23 seers,	88 0 0	8 8 0
Brown sugar, ...	35 seers, ...	4 6 0	0 3 6
Wax candles, ...	2 mds. 10 seers,	180 0 0	18 0 0
Indigo, ...	207 m. 8sr. 6ch.	22,728 15 5	1,136 7 4
Shoes, ...	1,498 pairs, ...	858 12 0	43 8 4
Total, ...		25,437 7 1	1,271 1 3
Total Imports and Exports, ...		67,705 1 1	5,505 1 9

These two statements are derived from the Custom House Registers, and can be therefore relied on.

No. 6.

Statement of Goods, imported from Cabool and the N. W. Frontier, during the month of February, 1841, the same being liable to the Custom Tax.

Names of Articles.	Quantity.	Value.			Amount of Duty.		
		Rs.	As.	Ps.	Rs.	As.	Ps.
Assafoetida, ...	11 mds. 20 seers.	1,150	0	0	115	0	0
	Total, ...	1,150	0	0	115	0	0

No. 7.

Statement of Goods, exported to Cabool across the N. W. Frontier, during the month of February, 1841, the same being Country produce, and liable to the Custom Tax.

Names of Articles.	Quantity.	Value.			Amount of Duty.		
		Rs.	As.	Ps.	Rs.	As.	Ps.
Cloth, ...	66,495 pieces,...	89,052	5	10	2,226	10	3
Kimkhab or Bro- cades, ...	91 pieces, ...	2,334	0	0	175	0	11
Hides, ...	30 ...	150	0	0	7	8	0
Benares Dooputtas,	9 pieces, ...	139	3	0	10	7	0
Wax candles, ...	2 mds. 30 seers,	220	0	0	22	0	0
Iron goods, ...	3 maunds, ...	30	0	0	3	0	0
Shoes, ...	959 pairs, ...	506	4	0	25	5	0
Mirzapoor carpets,	1 md. 15 seers,	41	4	0	3	1	6
Iron wire, ...	2 seers, ...	1	12	0	0	2	10
Tobacco, ...	1 md. 20 seers,	7	8	0	0	6	0
Lac, shell and stick,	2 mds. 11 srs. 8 c.	18	4	3	1	11	4
Embroidered belts,	8 ...	36	0	0	2	11	2
Indigo, ...	424 m. 37 srs. 2 c.	46,798	5	11	2,339	14	5
	Total,	1,39,334	15	0	4,817	14	5
Total Imports and Exports. ...		1,40,484	15	0	4,932	14	5

These two Statements are derived from the Custom House Registers, and can therefore be relied on.

No. 8.

Statement of Goods, exported to Cabool across the N. W. Frontier, during the month of March, 1841, the same being British manufactured.

Names of Articles.	Quantity.	Value.	Remarks.
		Rs. As. Ps.	
Long cloth, mus- lins, &c. }	5,255 pieces,	25,859 0 0	

No. 9.

Statement of Goods imported from Cabool across the N. W. Frontier, during the month of March 1841, the same being liable to the Custom Tax.

Names of Articles.	Quantity.	Value.	Amount of duty.	Remarks.
	Mds. Seers.	Rs. As. Ps.	Rs. As. Ps.	
Assafœtida. ..	100 23	9,087 8 0	905 12 0	

No. 10.

Statement of Goods exported to Cabool across the N. W. Frontier, during the month of March, 1841, the same being Country produce, and liable to the Custom Tax.

Names of Articles.	Quantity.	Value.	Amount of duty.	Remarks.
		Rs. As. Ps.	Rs. As. Ps.	
Cloth pieces, silk and cotton. }	91,419 pieces	1,60,805 4 0	2,695 12 3	
Benares doputtas and brocades, &c. }	982 do.	21,259 10 3	1,593 10 8	
Indigo,	397 mds, 27½ sr.	43,838 5 4	2,191 14 7	
Gotah kenaree,	428 tolahs	1,087 9 6	54 6 1	
Shoes,	176 pairs	382 8 0	19 2 0	
Hides,	140	84 0 0	4 3 2	
Ivory,	35 seers	87 8 0	6 9 0	
Verdigrease,	25	59 6 0	5 15 0	
Cocoanuts,	1000	40 0 0	2 0 0	
Cassia,	7 mds.	245 0 0	6 2 0	
Sugar,	2 do, 20 seers	20 0 0	1 0 0	
Total,	.....	2,37,909 3 1	6,580 10 9	
Total Imports and Exports, .....	.....	2,46,996 11 1	7,486 6 9	
Ditto including British linen, }	.....	2,72,855 11 1	.....

*Note to Mr. VINCENT TREGEAR'S Process of taking casts of Coins.
vide No. 110.*

I must not omit to observe, that the above process cannot be applied to all coins indiscriminately. Copper and brass coins are sometimes so much oxidated as to be unable to bear any pressure, and therefore would be broken if put in the press ; those of gold or silver are seldom endangered ; but still the operator must use a little discretion. Care must also be taken not to continue the pressure further than is required for the perfect copy of the coin, as after the latter has sunk to the full depth of the relief, a lateral extension takes place, which will injure it, as I have found by experience.

JOURNAL

OF THE

ASIATIC SOCIETY.

Of the early History of Sindh, from the "Chuch Namuh" and other authorities. By LIEUT. POSTANS, *Assist. Pol. Agent, Shikarpore.*

[Concluded from p. 197.]

CHAPTER V.

Origin of the tribe of *Soommah*—rule of the *Jams*—invasion of *Sindh* by *Shah Beg Urgphoon*—and downfall of the *Soommah* dynasty.

The tribe of *Soommah*, they say, belonged to the tribe of *Ukrumeh*.
Origin of the tribe *Bin Issam Bin Ubbi Jahal*, and according to *Meer of Soommah*.
Massoom, embraced *Islamism*; and were obedient to *Bin Cassim* when he arrived in *Sindh*, in the year 92 H. *Ukrumeh* traced his origin, as connected with *Jamsheed*, hence it is supposed their governors styled themselves *Jams*. Others again trace the origin of this tribe to *Sam*, the son of *Noah*, from which they derive their name *Sammahs*, or *Soommahs*.

They were *zumeendars* in *Sindh* of some importance, and on the downfall of the *Soomrah* dynasty, assumed the reins of government, with the title of *Jam*. Their capital city was *Tattah*.

Reigns of the *Jams*. The first of this family mentioned is

Jam Oonur,

who was, by the consent of the tribe of *Soommah*, proclaimed governor. *Mulck Rutrun*, one of the deputies of the kings of *Turkey* threatened *Seestan*; *Oonur* defeated him, and after a reign of three years and six months died.

Jam Joonur Bin Babeenah

succeeded his brother in the government of the country. He appointed his brother and relations to various posts in his dominions;

his rule was established in *Sindh* until *Sooltan Ullahul-deen* sent his own brothers, *Uglugh Shah* and *Tartar Khan*, to subdue him. Before the arrival of this army, *Jam Joonur* was seized with quinsy and died; he reigned thirteen or fourteen years. *Ullahul-deen's* army reached *Bukkur*, took that fort, and then proceeded to *Seeostan*.

Jam Kajee Bin Jam Joonur

succeeded his father, but was deposed by *Jam Khier-ud-deen Bin Jam Tumachee*, who with his father had been taken to *Delhi*, as a prisoner, by *Ullahul-deen*, in his descent upon *Bukkur*. He was just and good; he reigned some years and died.

Jam Babeenar.

After the death of *Jam Khier-ud-deen*, *Jam Babeenar* was, by the consent of the nobles, seated upon the throne. During his reign, *Sooltan Feeroz Shah*, who had conquered *Hindostan* and *Goojrat*, turned an ambitious eye towards *Sindh*, and marched to take possession of that country.

Jam Babeenar prepared to oppose him, and after a campaign of three months, the rainy season coming on, and the *Shah's* army beginning to suffer from the violence of the weather, and myriads of mosquitoes, was obliged to fall back upon *Goojrat*.

After the rains he again attempted *Sindh*; the war was furious, but the *Shah* was at length successful. *Babeenar* was taken to *Delhi*, where he distinguished himself in the service of *Shah Feeroz*, who honoured him and restored him to the kingdom of *Sindh*. He died after a rule of fifteen years.

Jam Tumachee

succeeded his brother; he was a rich and indolent man. After a reign of thirteen years, passed in luxury and pleasure, he died of the plague.

Jam Sullahudeen.

In the beginning of this reign, the dwellers in the desert disturbed the frontiers of his dominions; he punished them, and reigned for a period of eleven years and some months; when he died.

Jam Nizam-ud-deen

succeeded his father. He was occupied in sensual enjoyments, and neglected his dominions.

The nobles conspired against him, drove him from the throne, and placed *Jam Alee Sheer* upon it in his stead. He fled towards *Goojrat*, and died upon the road.

Jam Alli Sheer Bin Tumachee

was just, bountiful, and learned; he strengthened his power in *Sindh*, and the country prospered under his rule; but at length he gave way to luxury and ease. It was his practice to take his exercise on moonlight nights, and the rebellious nobles, *Sikunder Kirun* and *Futteh Khan*, (sons of *Tumachee*,) who were living in the desert, formed a plot, in which they were joined by some of the disaffected in the city of *Tattah*, to way-lay *Alli Sheer* and murder him. On the night of *Joomah*, the 13th of the month, *Jam Alli Sheer*, as usual, took boat and proceeded on the river; when he was about to return to the city, these men rushed upon him with naked swords and slew him and his attendants, placing *Jam Kirun* on the throne. *Alli Sheer* reigned seven years.

Jam Kirun Bin Jam Tumachee.

This man did not conciliate the nobles of the city, many of whom he imprisoned and punished. He was afterwards murdered at the instigation of *Futteh Khan* and *Bin Sikunder Khan*, who usurped the throne.

Jam Futteh Khan

ruled with justice, and was renowned for his bravery and magnanimity. He reigned for fifteen years and some months, when he died; he bequeathed the throne to his brother *Jam Tughluk Bin Sikunder Khan*.

Jam Tughluk, styled Jam Tughluk Shah.

He passed much of his time in hunting and traversing his dominions. The *Beloochees* in the neighbourhood of *Bukher* broke into rebellion, which *Tughluk* put down. He reigned for twenty-eight years, and died.

Jam Sikunder, son of Futteh Khan, and nephew of Tughluk Shah.

In the beginning of this reign a man named *Moobarik*, a connection of *Tughluk Shah's*, tried to usurp the sovereignty of the country, styling himself *Jam Moobarik*; but was deposed by the nobles, after a reign of three days. *Sikunder* died after a reign of eighteen months.

Jam Raeduch.

After the death of *Sikunder*, this man came with a large force to *Tattah*, disclaiming any intention of seizing the throne, but to offer protection to the Mussulmans, promising allegiance to whomsoever they should elect as *Jam*; not finding a fit person, they elected *Raeduch* himself to the sovereignty. In eighteen months he subdued the whole of *Sindh* to his authority. When he had reigned for a period of eight years and a half, *Jam Sunjin* usurped the sovereignty, and killed *Jam Raeduch* by putting poison in his wine cup.

Jam Sunjin

was a prince noted for his beauty and pleasing deportment. It was foretold him by a holy *Durwesh* that he should govern *Sindh*; and on the death of *Jam Raeduch*, he was universally elected to the throne. The country flourished under his rule, and was more prosperous than it had ever been under his predecessors. The soldiers and subjects were happy and at peace; he encouraged learned and holy men, and once a week gave alms to the poor. He reigned eight years, and died.

Jam Nizam-uddeen, better known as *Jam Nundeh*.

In the year 866 H. 1461 A. D. on the 25th of the month *Rubeh* 866 H. 1461 A. D. *Ul-uwul* ascended the throne; he was well received by all classes, and became a powerful ruler. He was on terms of great intimacy with *Sooltan Hassan Lankar*, of *Mooltan*. At the end of this reign, *Shah Beg Urghoon* sent a large army from *Kandahar*, which laid waste most of the places of *Chundookeh* and *Sundeecheh*. *Jam Nundeh* prepared and dispatched a force to oppose this invasion; the forces met at *Dureh Rowul*, (known as *Julogeer*,) where a great battle was fought, in which the brother of *Shah Beg* was killed, and his troops defeated. They fled to *Kandahar*, nor did they again molest *Sindh* during the time of *Jam Nundeh*. He passed the rest of his life in the society of *Moolahs*, and died after a reign of forty-eight years. The country was at his death torn with dissensions and rebellion.

Jam Feeroz.

After the death of *Jam Nundeh*, his son *Jam Feeroz* was a minor, and *Jam Sullahudeen*, the grandson of *Jam Sunjur*, wished to usurp

the throne, but was prevented by *Durya Khan*, a relative and prime minister of *Jam Feeroz*, aided by *Sirhung Khan*. The nobles of *Tattah*, with one consent, placed *Jam Feeroz* upon the throne of his father. *Jam Sullahudeen* fled to *Sooltan Muzuffir* of *Goojrat*, who was his kinsman, and favoured his pretensions to the government of *Sindh*. *Jam Feeroz* being young and inexperienced, neglected his affairs, and his court was composed of the gay and licentious. He passed most of his time in the *harem*, patronizing dancing girls and jesters. *Durya Khan* disgusted at his conduct, left the court, and went to his *jhageer* at *Kahan*. The affairs of the country, were speedily in a state of utter confusion, and the nobles of *Tattah* finding no longer any safety for the lives and property of themselves or families, wrote to the usurper, *Sullahudeen*, to come and seize the throne. *Sullahudeen* shewed the letter which contained this intimation to *Muzuffur Khan*, who dispatched a force with the former, with which he marched, took *Tattah*, and proclaimed himself *Jam*. *Jam Feeroz* repenting of his errors, fled with his mother to *Durya Khan* at *Kahan*, who levied troops from the tribes of *Belooch*, and other men of the desert; these joined with the armies of *Bukkur* and *Seeostan*, succeeded in expelling *Sullahudeen*, and once more placed *Feeroz* upon the throne of *Tattah*, where he remained for some years, until the country of *Sindh* was invaded by *Shah Beg Urghoon*, 926 H. 1519, A. D.

926 H. 1519 A. D. from which may be dated the termination of the
Termination of the *Soommah* dynasty. *Soommah* dynasty in the government of that country.

CHAPTER VI.

Shah Beg Urghoon—His origin—Death of his father, *Ameer Zulnoon*—becomes governor of *Kandahar*—*Baber Shah* expels him from *Kandahar*—he conquers *Tattah*, and becomes master of *Sindh*—Reinstates *Jam Feeroz* as governor of *Tattah*—*Sullahudeen* attempts to take *Tattah*, is defeated—his death—revolt of the *Dhareejas*—punishment of that tribe—drives the *Syuds* from *Bukker*—massacre of the *Beloochees*—death of *Shah Beg Urghoon*.

Shah Beg Urghoon was the son of *Zulnoon Urghoon*, *Bin Meer Hassan Bussein*, a noble in the service of *Sooltan*—his origin. *Hussein Mirza*, of *Khorassan*, who gave him the government of the countries of *Ghoor* and *Zameendawur*. He had some difficulty in bringing the unruly inhabitants of the desert and the tribes of *Hizareh* to his authority; but after a war of about four years with these people, he completely subdued them; and *Sooltan Hussein Mirza* was so much pleased with his conduct, that he added the country of *Kandahar*, and the provinces of *Shal*, *Sitoonuk*, and *Urghoon*, to his rule.

His power increasing, *Sooltan Hussein Mirza* became jealous, and summoned *Ameer Zulnoon* to his presence, where he detained him under trifling excuses for some time. During his stay at that court, he formed a firm friendship with *Budeh Ul Zerman Mirza*, a noble, and relative of the king. Being at length disgusted with the delays and subterfuges used to detain him, he effected his escape to *Kandahar*, where he proclaimed himself independent. He was here joined by *Budeh Ul Zuman Mirza*, who had quarrelled with the king, (*Sooltan Hussein*.) *Ameer Zulnoon* married his daughter, thus strengthening the bonds of amity between them. After some time peace was concluded between these two chiefs and *Sooltan Hussein Mirza*. *Ameer Zulnoon* met his death in attempting to resist an

Death of *Ameer Zulnoon*.

invasion under *Mahomed Khan Shibanee Uzbek*. He left two sons, *Shah Beg* and *Mahomed Mukim*; the former by the consent of the nobles, succeeded his father as governor of *Kandahar*; he confirmed all the appointments held under his father *Ameer Zulnoon*, was wise, brave, and generous, patronizing learned men.

When *Mahomed Khan Shibanee* had conquered *Khorassan* he meditated an attack upon *Kandahar*, but *Shah Beg* sent ambassadors

to him, with letters of submission and presents; he struck his image upon the coin, and begged permission himself to wait upon him. *Mahomed Khan* waived this ceremony, and being pleased with the conduct of *Shah Beg* and his brother, honoured their ambassadors, and dismissed them with dresses of honour, horses, tents, &c. for the two princes.

In the year 923 H., 1517 A.D. *Baber Shah* came from *Cabool* and *Ghuznein*, to conquer *Kandahar*; the brothers 923 H., 1517 A.D.

were overpowered, and driven from their country, their father's treasury was pillaged, and a daughter of *Mahomed Mukim* (*Shah Begum*, she married *Kassim Kokeh*, who was killed in the wars of the *Uzbecks*) was taken to *Cabool*. *Baber Shah* left his brother, *Sooltan Nasir-ud-deen*, as governor of *Kandahar*. The brothers afterwards collected a large force, and retook *Kandahar*. (About this time *Mahomed Mukim* died.) *Baber Shah*, however, continued to invade *Shah Beg's* country, who was at length obliged to abandon

Baber Shah expels *Shah Beg* from *Kandahar*.

the possession of it, and having for some time contemplated the conquest of *Sindh*, even as far back as the time of *Jam Munde*, he prepared an army, and in the year 926 H. 1519 A.D., on the 11th of the month *Mohurrum*, crossed the river opposite *Tattah*. The army of *Jam Feeroz* under *Durya Khan* was routed, the latter taken, and *Tattah* fell to the arms of *Shah Beg*. He permitted his troops to pillage the city for nine days, the inhabitants being exposed to the licentiousness of the soldiery during that period; on the intercession of *Hafiz Mahomed Shurreef* it was stopped.

Jam Feeroz leaving his family in *Tattah* fled to *Peerar*, whence he sent messages of submission to *Shah Beg*; this latter not only treated him with the greatest kindness, but after settling the affairs of *Tattah*

Reinstates *Jam Feeroz* as governor of *Tattah*.

appointed him its governor, placing one-half of the whole province of *Sindh*, viz. from *Lukie*, (which is near *Sehwan*), to *Tattah* under his dominion; from *Lukie* higher up, he delegated to his own servants.

When he had settled the affairs of *Tattah* he proceeded to *Siemer*,

Sulahudeen attempts to take *Tattah*.

but the usurper *Sullahudeen*, (who had before driven *Jam Feeroz* from the throne,) having collected a large force, threatened *Tattah*. *Shah Beg* sent a body of troops under his son *Mirza Shah Hussein* to reinforce *Jam Feeroz*.

Sullahudeen retreated but was pursued, and his troops overthrown ;
 His defeat and death. his son, *Hybut Khan*, being killed. This affliction rendered the father desperate, and he also met his death in the same campaign, in an attack upon the *Moghuls*.

At this time *Sooltan Mahmoud Khan*, governor of *Bukkur*, wrote to *Shah Beg*, who had taken up his residence at *Baghbanan*, that the tribe of *Dhareejas* were in a state of rebellion, refusing to pay their taxes, and ill-treating the servants of *Shah Beg*, who were sent to collect them ; and that but for the fidelity of the *Syuds*, who had assisted *Mahmoud Khan* in repelling their attacks, *Bukkur* must have fallen into the power of those insurgents.

Shah Beg on hearing this, came himself to the neighbourhood of *Bukkur*, where he ordered the *Dareejas* to be punished.

Mahmoud Khan with the cruelty for which he was remarkable, cut off the heads of about 50 of these people and threw them from the walls of the fort, as a warning to the others.

The *Syuds*, who for many years possessed great power in *Bukkur*, excited the jealousy of *Shah Beg*. He removed them from the fort of

Bukkur to a place outside the walls, called *Lohurry*.
 Drives the *Syuds* from *Bukkur*.

Shah Beg himself visited the fort, and directed a wall to be erected round it, with bricks from the ruins of *Alor*. The buildings in the vicinity of *Bukkur* belonging to the Turks and men of *Soommah* he also destroyed, employing the materials for the same purpose. At that time the fort was surrounded by water.

Having settled the affairs of *Bukkur*, *Shah Beg* turned his attention to the tribe of *Beeloochees*, who were in rebellion ; this he quelled by a general slaughter of the tribe wherever they could be found. In forty-two towns and villages these people were put to the sword.

Shah Beg after this contemplated extending his power to *Goojrat* ; but hearing that *Baber Shah* had occupied *Kooshab*, intending to conquer *Hindustan*, he became thoughtful, and assured his followers that he was convinced, *Baber Shah* would not let him retain the conquest of *Sindh*, but would drive him and his family from all their possessions. A settled melancholy took possession of *Shah Beg*, and on the death of *Shah Beg* 28th of the month *Shuban*, in the year 928 H. 1521 A. D. he died, after a stormy reign in *Sindh* of two

Death of *Shah Beg*
Urghoon, 928 H.
 1521 A. D.

years. His remains were taken to *Bukkur*, and thence to *Mecca*, where his son, *Shah Hussein*, erected a dome over them.

CHAPTER VII.

Mirza Shah Hussein Urghoon succeeded his father *Shah Beg*—conquers *Mooltan*—gives that country to *Baber Shah*—marches to *Kutch*—defeats *Kungur*—*Humayun Padshah* comes to *Sindh*—appoints *Yad Gar Nasir* to the fort of *Bukkur*—*Shah Hussein* brings *Yad Gar* over to his interests—Peace proclaimed between *Shah Hussein* and *Humayun*—The latter leaves *Sindh*—*Yad Gar* quits *Bukkur*—*Sindh* again reverts to *Shah Hussein*—he protects *Kamran Mirza*—death of the latter, and affection of his wife—death of *Mirza Shah Hussein*—and termination of the dynasty of *Urghoon*.

Mirza Shah Hussein succeeded his father *Shah Beg* in the government of *Sindh*. His first act was to succeeds his father. expel *Jam Feeroz*, who had rebelled, from the government of *Tattah*. This latter collected a large force, but was completely overthrown, and fled to *Goojrat*, where he died.

Shah Hussein acknowledged fealty to the power of *Delhi*, and caused the oration delivered on the installation of a prince (*khoobeh*) to be read in the name of *Baber Shah*, instead of his own. He took up his residence at *Tughlukabad*, near *Tattah*. Some rebellious amongst the tribes of the *Beloochees* at *Oobareh* and men of *Dihir* being put down by the sword, *Shah Hussein* turned his attention to the conquest of *Mooltan*. In the year 931 H. 1524 A. D. he reached the fort of *Sewrae*, which he took and destroyed. He then proceeded to the fort of *Moos*, near *Kootab*, the governor of which, *Sheikh Rohillah*, proffered submission; 500 horse, under *Mohib-i-Tukhan*, were dispatched in advance to *Mooltan*, and *Shah Hussein* followed to *Oochek*. This fort he besieged, and although the troops of *Mahmood Lankar*, governor of *Mooltan*, made a brave resistance, the fort was taken, and a general massacre followed. At the intercession of some holy men the slaughter was stayed, but the fort was levelled to the ground, and the gates and other materials placed in boats and conveyed to *Bukkur*. When *Mahmood*

Lankar heard of the fall of *Oocheh*, he marched to attack *Shah Hussein*, but shortly after met his death by poison. He was succeeded by his son, *Hussein Lankar*, who was a minor.

Mirzah Shah Hussein closely besieged the fort of *Mooltan*; the siege lasted for a year, and is described as having been attended with all the horrors of famine; one ox's head sold in *Mooltan* for 100 *tankah*, one maund of wheat 100 *tankah*. The inhabitants principally subsisted upon the skins of oxen; dogs and cats were esteemed as great delicacies in *Mooltan*, as *hulwah* (sweetmeat). Many of the wretched inhabitants threw themselves from the walls and sought protection from *Mirza Shah Hussein*.

At length the fort was taken, a general massacre ensued of all males from the age of seven to seventy, and lasted twelve days. When the rage of *Shah Hussein* had somewhat abated, he stayed this inhuman slaughter, and spared the lives of the survivors.

Hussein Lankar, the prince of *Mooltan*, was captured, and after a stay of ten months, during which period he employed himself in stripping all the nobles and followers of *Mahmood Lankar* of their property, and imprisoning others, *Mirza Shah Hussein* returned to *Bukkur*, leaving *Khajee Shumsudeen* and *Dost Meer* at *Khor* with 200 horse, 100 infantry, and 100 artillery to garrison *Mooltan*. He had only arrived at *Bukkur* a short time, however, when he received intelligence of the revolt of the governor of *Mooltan*, who had gone over to *Baber Shah*;

Gives Mooltan to Baber Shah. but being at the same time apprised of an attack in another quarter of his dominions, at *Tattah*, he preferred presenting the country of *Mooltan* to *Baber Shah*, as he found its government more than he could manage. The nobles of *Tattah* on the arrival of *Mirza Shah Hussein* at *Bukkur*, had informed him that *Kungar* was collecting a force to attack *Tattah*. On receiving this intelligence, he immediately proceeded to that place, and before the arrival of *Kungar*, marched to attack him. When he arrived near the country of *Kutch*, his army suffered much for want of grain; but *Kungar's* army shortly after was overthrown, and the country pillaged by *Shah Hussein* of flocks, herds, and property of every description, and the inhabitants of every city, town, and village put to the sword.

In the year 947 H. 1540 A. D., *Humayun Padshah*, attended by *Mahmoud Kamran Mirza*, being driven out of *Hind* *Humayun comes to Sindh, 947 H. 1540, A. D.* by *Sheer Khan*, came to *Lahore* with the intention of making an incursion upon *Sindh*, on the 13th of

Ramazan. In the above year he halted with his force at *Paburloo*, in the neighbourhood of *Bukkur*. *Sooltan Mahmood*, governor of the fort, laid waste the surrounding country, anchored the boats under the walls of the fort, and prepared for a vigorous defence. *Humayun* summoned him to surrender, but he refused; the *Padshah's* servants, however, managed to trifle with *Mahmoud*; and he sent 500 *khirwars* of grain to *Humayun's* camp. This latter finding his army suffer much for want of supplies, wrote in friendly terms to *Mirza Shah Hussein* to come to him at *Bukkur*; but after waiting for five or six months in expectation of seeing him, he was disappointed, for *Shah Hussein* evaded the interview, and cut off all supplies from the *Padshah's* camp. This, coupled with the swells of the river, occasioned great suffering amongst his troops, and desertions became frequent. He pro-

ceeds to *Seeoostan*, leaving the siege of *Bukkur* in the hands of *Yad Gar Nasir*, who took the fort.

At this period, *Mirza Shah Hussein* wrote to *Yad Gar Nasir*, offering terms of friendship, promising him his daughter in marriage, and

to secure him the kingdom of *Sindh* after his death.

(*Shah Hussein's*) death; enticed by these promises *Yad Gar Nasir* threw off his allegiance to the *Padshah Humayun*.

Humayun on hearing this, immediately returned to the neighbourhood of *Bukkur*, where he summoned *Yad Gar* to his presence—he obeyed the order.

Through the intervention of *Benam Khan*, who came from *Goojrat* to the service of the *Padshah*, peace was declared between the *Padshah and Mirza Shah Hussein*.

Humayun agreed to leave *Sindh*, on condition of receiving 100,000 *miskals* in money, and all the necessaries for his army to *Kandahar*, 300 horses, 300 camels, &c. This demand was acceded to, and with great rejoicings and promises of friendship, the *Sindhians* witnessed the passage of the river by the *Padshah's* army, at a place called *Joon*, where a bridge had been erected on the 7th of the month *Rubeh ul Uwul*, in the year 951 H. 1544 A. D.

Humayun leaves Sindh, 951 H. 1544 A. D.

Shah Hussein after this, evaded the promise of giving his daughter *Yad Gar* quits in marriage to *Yad Gar Nasir*, who left the country; and the power in *Sindh* reverted solely to *Mirza Shah Hussein*, who appointed *Meer Shah Mahmoud Urghoon* governor of *Bukkur*.

Kamran Mirza being in rebellion with *Humayun Padshah*, son of *Baber Shah*, fled to *Sindh*, and sought protection from *Mirza Shah Hussein*, whose daughter, *Joirjok Begum*, he had previously married. *Shah Hussein* appointed him for a residence the place called *Shuhperlal*, on the river to the west of *Bukkur*, with the purgunnah of *Butthoora* for the expences incidental to his household. But *Kamran Mirza* determined to make a pilgrimage to *Mecca*, and there end his days. *Shah Hussein* tried to prevent his daughter accompanying him; but her conjugal affection resisted all his persuasions to effect a separation. She observed to her father: "that he had given her to *Kamran Mirza* for wife when the latter was a powerful prince, and now that misfortunes had assailed him, he wished to separate them; but that while they lived she would never desert her husband." *Shah Hussein* finding threats and intreaties alike unavailing, gave them every necessary for their journey, and *Kamran Mirza* died at *Mecca* in the year 964 H. 1556 A. D. His faithful wife only survived him a few months.

Mirza Shah Hussein in the latter days of his life became very infirm, and suffered much from palsy, from which disease he sought relief in intoxication, and dissipated men began to assume an ascendancy at his court. The men of *Urghoon* and *Tirkhan* being dissatisfied, collected round *Mirza Eessan Tirkhan*, governor of *Tattah*, and in the year 962 H. 1554 A. D. broke into open insurrection. *Shah Hussein* sent *Mahmoud*, governor of *Bukkur*, to quell this rebellion; but he privately made terms with *Mirza Eessan Tirkhan*, by which after the death of *Shah Hussein*, (an event they plainly saw was fast approaching,) they should divide the government of *Sindh* between them.

Mirza Shah Hussein died on Monday on the 15th of *Rubeh-ul-Death of Mirza Shah Hussein*, 962. H. 1554 A. D. *Uwul* in the above year, being on his road to *Seeoostan*, (where, by the advice of his physician, he

was proceeding,) at a place called *Allipootreh*. He reigned 34 years, and his remains were conveyed to *Mecca*, where they were buried near those of his father, *Shah Beg*. His death closed the dynasty of *Urghoon*.

CHAPTER VIII.

Mirza Eessan Tirkhan—dissensions between him and *Mahmoud Khan of Bukkur*—*Tattah* fired and pillaged by the *Portuguese*—peace concluded between *Mirza Eessan* and *Mahmoud Khan*—brief history of the former dissensions between his sons—death of *Mirza Eessan*—succeeded by his son *Mirza Mahomed Bakee*—at enmity with *Mahmoud Khan*—origin of the latter—*Mahomed Bakee*—opposed by his brother, *Khan Baber*—is murdered by *Mahomed Bakee*—*Akbar Padshah* sends *Mohib Ally Khan* to besiege *Bukkur*—*Mahomed Bakee's* a submission to the *Shah*—death of *Mahmoud Khan*—*Bukkur* becomes a *jahgeer* of the kingdom of *Dellhi*—*Mirza Mahomed Bakee* destroys himself.

Mirza Eessan Tirkhan.

A year after the death of *Shah Hussein*, rivalry and dissension arose
 963 H. 1555 A. D. between *Mirza Eessan Tirkhan*, governor of *Tattah*,
 Dissensions with. *Sooltan Mahmoud*, governor of *Bukkur*; the
 pretensions of the former being favoured by the men of *Urghoon* and
Tirkhan. *Mirza Eessan* marched to attack *Bukkur*, in which
 fort *Mahmoud* entrenched himself, and was besieged for 15 days; but at
 this time intelligence reached the former, that the *Portuguese* merce-
 naries, whom he had left at *Tattah*, had set fire
Tattah fired and pillag- ed by the *Portuguese*. to, and pillaged that city, he immediately raised
 the siege, and returned to *Tattah*. *Mahmoud* pursued him as far as
Seeoostan, the country in the vicinity of which he laid waste. On his
 arrival at *Tattah*, *Mirza Eessan* learnt that the *Portuguese* hearing
 of his approach, had decamped; he repaired the walls of the city, and
 built a small fort to command the creek. After other engagements
 between *Mirza Eessan* and *Mahmoud*, peace was concluded be-
 tween them; the forces of the *Mirza* returning to
Tattah, and those of *Mahmoud* to *Bukkur*, which
 places they occupied, and continued to divide the
 government of the country between them. *Mirza Eessan Tirkhan*
 is described as having been educated by *Shah Beg*,
 in whose service and that of his son, he attained the

Peace concluded be-
 tween *Mirza Eessan*
 and *Mahmoud Khan*.

History of *Mirza*
Eessan.

rank of *ameer*, and on the death of the latter, succeeded to the government of *Tattah*. He was a good and merciful man, noted for his courage and energy. Two of his sons, *Mirza Mahmoud Bahee*, and *Mirza Mahomed Taleb* were at enmity; the latter being favoured by his father, defeated *Mahomed Bahee*, who fled to *Bukkur* and sought protection from *Mahmoud*. *Mahomed Saleh* was shortly afterwards murdered by a *Beloochee*, who had sworn not to wear his turban, until he had revenged himself for some injury committed upon his father and family.

Mahmoud interceded with *Mirza Eessan* for the forgiveness of *Mahomed Bahee* who returned to *Tattah*, and was kindly received; but

Mirza Eessan before his death, which happened in the year 974 H. 1566, A. D. wished to settle the succession upon his youngest son, *Khan Baber*, as he considered *Mahomed Bahee* of too tyrannical a disposition to rule.

Mirza Mahomed Bahee Tirkhan

succeeded his father, *Mirza Eessan Tirkhan* as governor of *Tattah*, and like him continued alternately at peace and war with *Mahmoud Khan*, governor of *Bukkur*. A brief account of the career of this man, who for nineteen years divided the government of *Sindh*, with two of the rulers of *Tirkhan*, will not be out of place in this part of the history.

Mahmoud Khan was the son of *Meer Fazil Kukultash*, in the service of *Meer Zulnoon*; his forefathers were residents of *Ispahan*. *Meer Fazil* had five wives, by each of whom he had a son. *Mahmoud's* mother was an *Afghaun*. At the early age of fourteen he gave promise of great courage, and attracted the attention of *Shah Beg*, who took him into his service; he accompanied him in the *Sindh* campaign, where he distinguished himself above all the nobles of *Shah Beg's* army; he subsequently became a governor of *Bukkur* during the time of *Mirza Shah Hussein*, whom he faithfully served, until he leagued with *Mirza Eessan Tirkhan* to divide the government of the country between them after *Shah Hussein's* death. The history of these proceedings, and the feuds and jealousies which arose between these chiefs, have been related, till the accession of *Mirza Bahee*.

Mirza Mahomed Bakee was opposed by his youngest brother, *Khan Baber*, who aspired to the government of the country. He procured assistance from *Mahmoud Khan*, and attempted an attack upon *Tattah*, in which he failed; he was afterwards treacherously murdered by his brother, who proved himself, as his father had predicted, a great tyrant. Hearing that *Akbar Padshah* had arrived at *Lahore*, and had dispatched *Mohib Ally Khan* and *Mujahid Khan* to *Bukkur*, where they besieged *Mahmoud Khan*, and fearing for the safety of his own possessions at *Tattah*, he sent letters, acknowledging his fealty to *Akbar*, and according to some historians, even sent his daughter, for the service of the king's harem.

Mahmoud Khan endured a close and harassing siege, during which the garrison suffered from pestilence and famine. In the year 982 H. 1574 A. D., he began to suffer from dropsy, and wrote to the *Padshah* to send some one to whom he might deliver over the fort of *Bukkur*, which *Mohib Ally Khan* had not yet taken. The *Padshah Akbar* dispatched *Kessoo Khan*; but *Mahmoud Khan* died before his arrival at *Bukkur*, on Saturday the 8th of the month *Sufur* in the above year.

From this date *Bukkur* became a *jahgeer* of the power at *Delhi*, and various rulers were sent to govern it. *Mirza Mahomed Bakee* became insane; at least the deeds of cruelty he committed were so enormous, that they can only be ascribed to madness. The loss of a favourite son, (*Shah Rookh*), increased his malady, and he destroyed himself by rushing on his own sword. He died in the year 993 H. 1583 A. D. after a rule of 19 years. His eldest son, *Pabundah Beg*, inheriting the malady of the father, was declared incapable of governing, and the power descended to the son of *Pahbunde* and grandson of *Mirza Bakee*.

CHAPTER IX.

Mirza Janee Beg Tirkhan—Akbar sends *Khan Khanan* to *Sindh*—siege of *Sehwan*—defeat of the war boats—siege of *Bohurry*—destruction of *Tattah*—*Janee Beg* treats for peace—peace concluded—*Janee Beg* accompanies *Khan Khanan* to the presence—*Akbar Padshah* honours *Janee Beg*—death of *Janee Beg*—*Sindh* becomes a dependency of the throne of *Delhi*—*Mirza Ghazie Beg Tirkhan*—revolt of *Abul Cassim*—the *Padshah* sends for *Ghazee Beg*—he proceeds to *Agra*—additional power—repairs to *Kandahar*, where he is murdered—his generosity—rulers deputed by the *Delhi* sovereigns of the family of *Timoor* until the accession of the *Kalonas*—their rule—accession of the *Talpooras*.

Mirza Janee Beg Tirkhan.

His first act was to punish with studied cruelty, the accused murderers of the late *Mirza*. His uncle *Muzuffir Khan* disgusted at his conduct, collected a force to attack *Tattah*; but was defeated. *Bukkur*, as was before mentioned, after the death of *Mahmoud Khan*, became a

999 H. 1590 A. D.
Khan Khanan sent
 to *Sindh*.

dependency of the kingdom of *Delhi*, in the year 999 H. 1590 A. D. *Akbar Shah* gave it as a *jahgeer* to *Khan Khanan*, with orders to reduce the governor of *Tattah* (*Janee Beg*), also to his authority.

The Shah had previously written to *Janee Beg* to come to the presence, and proffer allegiance, a performance of which order the latter evaded. *Khan Khanan* first determined to take the fort of *Sehwan*, as it commanded the passage of the river, and then march to attack *Tattah*. He had, however, scarcely commenced the siege, when intelligence reached him of the march of *Janee Beg*, with a countless army, to the relief of the fort. *Khan Khanan* raised the siege of *Sehwan*, and proceeded to meet *Janee Beg*, who at a place called *Bohurry*, (higher up than *Nussurpoor*,) had thrown up a fort, and strengthened his position. When *Khan Khanan* arrived within six *koss* of that place, he learnt that *Janee Beg* had 300 war boats with him, commanded by *Khusroo Khan* and other nobles.

Khan Khanan threw up five or six small mud forts, which he mounted with guns, on the bank of the river, commanding the passage of the boats. On a night of the month *Shuwal*, 999. H. 1590 A. D. the action commenced, the shot striking the *Sindhian* boats, threw them into confusion; eight or nine were

Ascent of the war
 boats.

captured and their crews slaughtered. In the morning the boats of *Mirza Janee*, commanded by *Khusroo Khan*, finding the passage of the river in the face of the guns impracticable, retreated, but were pursued by the *Khan's* boats, and although *Khusroo Khan* behaved well, and shewed good generalship, many of his fleet were taken, and the *Portuguese* mercenaries and other soldiers slaughtered. In short, *Janee Beg* was defeated and retreated to *Bohurry*, where he

Destruction of
Tattah.

was invested by *Khan Khanan*. From this place he wrote to his son at *Tattah* to destroy that city; it was fired in various places, and in a month was a

complete ruin, and the country laid waste: this was done with the intention of annoying the invaders. Repeated engagements ensued, in which *Janee Beg's* forces were always worsted; he was driven from one stronghold to another, his last stand being at *Oonurpoor*. Here *Khan Khanan* came himself, and *Janee Beg* was closely besieged; finding his soldiers suffer, and all his efforts to repel the

Janee Beg treats
for peace.

Khan's army unavailing, he at last sued for peace, promising to surrender thirty boats and the fort

of *Sehwan*, intreating permission at the same time, to be allowed to proceed to *Tattah*, where he would see *Khan Khanan*, and settle other preliminaries. This indulgence was granted by the *Khan* contrary to the advice of his nobles, who represented that *Janee Beg*

Peace concluded.

wished only to gain time in order to collect fresh troops; but *Khan Khanan* confident in his power

to crush *Janee Beg*, and anxious to avoid the useless waste of life, which a protraction of the war would occasion, acceded to the terms offered by the *Mirza*. The two chiefs afterwards met at a place called *Futtebagh*, where they displayed every mark of friendship and consideration towards each other. *Khan Khanan* proceeded to *Tattah*, the affairs of which place he settled, leaving *Dowlut Khan* and *Khawgeh Mukim* to preserve the *Shah's* authority. *Khan Khanan* having expressed a desire to behold the sea, embarked with *Janee Beg*

Accompanies *Khan*
Khanan to *Agra*.

at the port of *Lahurry*; after a short excursion they returned, and in obedience to orders, proceeded to

the presence of *Akbar Shah*, where they arrived in the month of *Jumadee-ul-Sanee*, in the year of the H. 1001, A. D. 1592.

1001 H. 1592 A. D.
Is honoured.

Akbar Padshah honoured *Janee Beg*, making him

a commander of five thousand, and styling him *Khusroo Shah*; he treated him with every demonstration of kindness. In the year 1008 H. 1599 A. D. when the king marched to the *Deccan*, and took the forts of *Ahmednuggur*, *Ookleh*, and *Asserghur*, *Mirza Janee Beg* died of phrenzy. He was buried at *Tattah*, and his son *Mirza Ghazee* succeeded him in the government of the country. From this date, the whole of the country of *Sindh* became a dependency of the kingdom of *Delhi*, and ceased to be an independent government. The rule of the tribe of *Tirkhan** embraces a period of 39 years.

1008 H. 1599 A. D.

Dies, and *Sindh* ceases to be an independent government.

Mirza Ghazee Beg Tirkhan

after the death of his father, by order of the *Padshah*, succeeded to the government of the country of *Sindh*. He was young, but at the beginning of his rule shewed all the vigour and ability of riper years. He replenished the treasury and resources of the country, which during his father's reign had been squandered and allowed to go to ruin.

Revolt of *Abool Cassim*.

Abool Cassim, son of *Shah Cassim Khan Urghoon*, (who for years possessed *Nussurpore* and during the life of *Mirza Janee* also had *Neirunkhote*,) rose in rebellion against *Mirza Ghazee Beg*, and having plundered some merchants who were travelling from *Tattah*, the *Mirza* wrote to him for an explanation of the outrage, to which he received an offensive reply. *Ghazee Beg* thereupon marched a force to *Nusserpore*, but by the intervention of the father, (*Shah Cassim Khan*,) peace was concluded between his son and *Ghazee Beg*. The latter being afraid of the power of *Abool Cassim*, caught him by stratagem, put out his eyes, and made him prisoner. At this time, ambassadors arrived from *Akbar Padshah*,

The *Padshah* sends for *Ghazee Beg*.

to summon *Ghazee Beg* to his presence; but he excused himself, as the affairs of the country yet required much of his attention. In two years after his father's death things were in a prosperous state. The unfortunate *Abool Cassim*, aided by *Jaffer Khan*, attempted to escape, but was recaptured, and the latter killed. Again intelligence was received at *Tattah* that the *Padshah* being impatient, had dispatched the *Nuwab Syud Khan*,

* i. e. As independent governors.

with orders to bring the *Mirza* to the presence; some of the nobles expressed a desire to rebel against the *Padshah's* authority, and only regretted their want of means to assemble a force for that purpose. *Ghazee Beg's* prudence, however, silenced their ambitious projects, Proceeds to Agra and before the arrival of *Syud Khan*, he started for Agra, and met the latter at *Bukker*, from whence they proceeded together, and arrived at Agra in the year 1013 H., 1604 A. D.

Mirza Ghazee was honoured* and treated with the same consideration which marked his father's stay at the royal court. The country of *Sindh* was declared to be a *jahgeer*, and bestowed upon him. On the accession of *Shah Jahangir*, 1014 H. 1605 A. D. the government of the country of *Kandahar*, part of *Mooltan*, and the fort of *Sehwan* Additional power. were added to his authority, with additional rank. The affairs of *Kandahar* requiring his attention, he proceeded to that country, appointing *Khusroo Khan*, governor of *Repairs to Kanda-* *har.* *Tattah* during his absence. This man appropriated the revenues to his private purposes, which being reported to *Ghazee Beg*, he sent *Hindoo Khan* to supersede him, and to take the management of affairs in his stead. *Mirza Ghazee* in the very height of his fame and prosperity was murdered by a slave of his own household, named *Abool Lutteef*, in the year 1021 H. 1612 A. D. He left a great name behind him for generosity and bravery, and in his praise, is the following couplet:—

“Alas! a rose has been scattered by a slave.”

It is reported of him that he gave all his money to his subjects, and although he had the revenues of *Sindh*, *Kandahar*, His generosity. and part of *Mooltan*, he was always poor. His minister of finance once represented to him that his accounts, which had not been inspected for six months, were in confusion, and that he had not the means of providing for the *Mirza's* household expenses. *Ghazee Beg* tore the paper which was presented in pieces, saying: “that for himself God would provide him with food; but the public money was alone the property of the subject.”

* *Jahangir* even asked him his advice as to the measures he might pursue with his son *Khusroo*, then in rebellion; this is mentioned as a proof of the esteem in which the Emperor held him.

His remains were brought to *Tattah*, and interred near those of his father. After his death the *Delhi* kings, from the time of *Jahangir* until the accession of the *Kaloras*, sent various nobles as deputies to rule in that country.

Mirza Rustum

was deputed by *Jahangir*, after the death of *Ghazee Beg*, to proceed to *Tattah* as governor of *Sindh*; he had before

Rulers deputed by the Delhi sovereigns of the family of *Ti-moor*, until the accession of the *Kaloras*. been governor of *Zumeendarwar* and *Mooltan* during the time of *Akbar Padshah*. It is said that *Jahangir*

sent with him 5,000 horse, and two lacs of rupees to assist him in replenishing the treasury, and settling the affairs of the country; but he proved himself unfit to govern, and was dismissed. He was succeeded by *Moosty Khan*, also dismissed; he by *Meer Bayeozzeed*, 1028 H. 1618 A. D., who had been formerly *Fowjdar* of 1028 H. 1618. A. D. *Bukkur*. After him *Nuwab Shurf-ul-Mulk*, in the year 1035 H. 1625 A. D. During his time, the son of *Jahangir** being in rebellion, came to *Tattah*, where he wished to reside, but *Shurf-ul-Mulk* opposed him and some conflicts ensued.

Mirza Eessan Tirkhan, son of *Khan Baber*, and grandson of the former governor of the same name.

He was concerned with *Abool Cassim*, in the revolt against *Mirza Ghazee Beg*, and after the capture of the former, entered the service of *Jahangir*, who honoured him; and in reward for various services performed, made him a commander of 4,000 horse, and in the year 1037 H. 1627 A. D., (the last of the reign and life of *Jahangir*,) he was appointed governor of *Tattah*, in which situation he died, during the reign of *Shah Jehan*.

Nuwab Ameer Khan.

In the beginning of his rule he had some differences with the *zumeendars*, but he settled the affairs of the country, and was a good and just man. So little of interest is recorded in the histories of the succeeding governors, that it will be sufficient to mention them in chronological order:—

* Probably *Khurram Khan*, afterwards *Shah Jehan*, who rebelled against his father in 1624 A. D.

Date of Accession.

6th. Murab Muzuffar Khan, not known.

7th. Syud Ibrahim,	...	1057 H. 1647 A. D.	} During this rule <i>Aurang-</i> <i>zebe</i> mounted the throne.
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8th. Jafur Khan, ... 1063 H. 1652 A. D.

9th. Kabad Khan, ... 1069 H. 1658 A. D.

10th. Nuwab Lashkar Khan, ... 1071 H. 1660 A. D.

11th. Ghuzunfur Khan, .. 1075 H. 1664 A. D.

12th. Syud Izut Khan, ... 1080 H. 1669 A. D.

13th. Abool Nusrut Khan, ... 1082 H. 1671 A. D.

14th. Sahadut Khan, ... " "

15th. Syud Izut Khan, ... 1084 H. 1673 A. D.

16th. Khan Zad Khan, ... 1090 H. 1679 A. D.

17th. Sirdar Khan, ... 1095 H. 1683 A. D.

18th. Mureed Khan, ... 1099 H. 1687 A. D.

19th. Zaburdust Khan, ... 1101 H. 1689 A. D.

20th. Aboo Nusrut Khan, ... 1103 H. 1691 A. D.

21st. Ifuz Ali Khan, ... 1113 H. 1701 A. D.

22d. Saheed Khan, ... 1114 H. 1702 A. D.

23d. Ameer-ud-deen Khan, ... " "

24th. Yuzuf Khan, ... 1115 H. 1703 A. D.

25th. Ahmed Yar Khan,	...	1116 H. 1704 A. D.	} During this rule <i>Atumgeer</i> died, 1118 H. and was suc- ceeded by <i>Ba-</i> <i>hadur Shah</i> .
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26th. Nuwab Saheed Khan, ... 1119 H. 1707 A. D.

27th. Nuwab Moheen Khan, ... 1121 H. 1709 A. D.

28th. Nuwab Maheen Khan ... 1123 H. 1711 A. D.

29th. Nuwab Shakir Khan,	...	1124 H. 1712 A. D.	} <i>Bahadoor</i> <i>Shah</i> died 1124 H.
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30th. Khwaja Kulleel Khan, ... not known.

31st. Attar Khan, ... " "

32nd. Lootuf Ali Khan, ... " "

33rd. Shoojat Ali Khan, ... " "

- 34th. Nuwab Azim Khan, ... 1128 H. 1715 A. D.
 35th. Mohabut Khan,... ... 1132 H. 1719 A. D.
 36th. Sooltan Mahomoud Khan, not known.
 37th. Serf Ullah Khan, ... „ „
 38th. Dileerdil Khan,... ... 1143 H. 1730 A. D.
 39th. Himmut Dileer Khan,... „ „

The above appear to have been *Sobadhars* who farmed the revenue, at the same time exercising all the functions of governors. The last of these mentioned as preceding the *Kaloras*, is *Sadik Alli Khan*, who abandoned his contract from inability to perform it, and it was taken up by *Noor Mahomed Ubbaseer Kalora*, son of

Noor Mahomed Kalora, 1st of the family who ruled 1149 H. 1736 A. D.

Yar Mahomed in the year 1149 H. 1736 A. D. He was the first of the family invested with power as a ruler in *Sindh*, and although in his father's time the *Kaloras* were of some importance as *zumeendars*, their *jahgeer* was at *Futtehpoor*.

This family trace their origin to *Abbas*, the uncle of the prophet, whence it descends through various generations to *Adam Shah* of *Beelooch* extraction, a *Sheikh* of great repute, who possessed many disciples in *Sindh*, and who was the founder of the prosperity and power which afterwards attended the *Kaloras* in that country.

Noor Mahomed Kalora.

The beginning of his government was attended with constant feuds and strife with the tribes of *Burhoe* and *Darwood* and *Pootreh*, (*Belooches*), the cause of dispute being boundary of territory. About the year 1150 H. 1737 A. D. *Nadir Shah* when he visited *Sindh*, took *Noor Mahomed* prisoner; but on his paying a crore of rupees to the emperor, he was released and restored to his possessions, with the additional title of *Kullie Khan*.

After this he became firmly settled in the government of the country.

After the assassination of *Nadir Shah*, *Sindh* became subject to

Sindh subject to *Cabool*.

Ahmed Shah Afghan Sudoozie, king of *Cabool*. *Noor Mahomed* was succeeded by his son *Murad Yab Khan*, who only ruled however for a short time, and was succeeded by his brother *Ghullam Shah*.

In the commencement of his reign he was employed in putting down an insurrection under his brother *Uttur Khan*; but having settled the dissensions and civil discords in *Sindh*, he made an incursion upon *Cutch*, rendered remarkable for the great battle of *Jharra*, which was fought with *Rao Gore* upon the

Battle of *Jharra*.

occasion. He died after a rule of 17 years. His brother *Uttur Khan* seized the reins of government, but only retained them for a short time, and was succeeded by *Surafraz Khan*, son of *Ghulam Shah*.

Shortly after coming to power, he allowed his mind to be poisoned by one *Rajah Leckie* against a chief of distinction in his service, named *Byram Khan Talpoor*. *Byram* being informed of the threatened evil, took counsel with his sons *Sobhdar* and *Bejur* to avert it; but *Surafraz* put both *Byram* and his son *Sobhdar* to death; *Bejur* fled to *Mecca*.

Futteh Alli Khan, the son of *Sobhdar* raised an insurrection to revenge his father's death, and *Surafraz Khan* fled to the fort of *Hyderabad*, where he was imprisoned. His brother *Mahomed Khan* succeeded him for a short time; but was deposed by *Ghullam Nubbee*, brother of *Ghullam Shah*. *Bejur Khan Talpoor*, son of *Byram*, at this time arrived from *Mecca* at *Neirunkote*, and *Ghullam Nubbee* sought an opportunity to destroy him. *Bejur* having collected followers an engagement ensued, in which *Ghullam Nubbee* was killed, and *Bejur Khan* became master of *Sindh*, putting *Abdul Nubbee*, the brother of *Ghullam Nubbee*, in his brother's place, as governor of the country. *Abdul Nubbee's* first act was to destroy *Surafraz Khan*, *Mahomed Khan*, *Uttur Khan*, and *Meer Mahomed*, at *Hyderabad*, where they were imprisoned.* His next, to send *Ijut Khan* with a force to attack *Bejur Khan*; the former was defeated. *Abdul Nubbee* afterwards murdered *Bejur Khan*, when the *Talpoors* drove out *Abdul Nubbee*, putting the affairs of the country in the hands of *Futteh Alli Khan Talpoor*, son of *Sobhdar* and grandson of *Byram*, in which *Timoor Shah* confirmed him. He gave a share of his power

Deaths of *Gullam Nubbee*.

Abdul Nubbee placed in power.

Murders *Bejur Khan*—the *Talpoors* drive out the family of the *Kaloras*, &c.

* This wholesale system of putting princes out of the world, is vouched for in the "*Futteh Nameh*."

to each of his brothers, *Ghullam Ali*, *Kurm Ali*, and *Murad Ali*. *Futteh Ali Khan* and *Ghullam* died; the former in 1801 A. D. 1216 H., and the latter in 1811 A. D. 1226 H. *Futteh Ali* left a son, (*Sob-dhar*,) and *Ghullam* also (*Mahomed*,) who with their uncles, *Murad Ali* and *Kurum Ali*, share the government of *Sindh*, with the title of *Ameers*.

NOTE.—It is impossible to add to the already very luminous and interesting history given by Dr. J. Burnes in his visit to the Court of Sindh, of the rulers of the families of the Kaloras and Talpuras; as my paper would not however have been complete without some notice of their dynasties; I have compressed them into a close and small space, leaving out most of those incidents which have been so graphically described by Dr. Burnes.

T. P.

Notes on the Manners and Habits of the Torkoman Tribes, with some Geographical Notices of the Country they occupy.—By
EDWARD STIRLING, ESQ. B. C. S.

The *khonat* of *Khiva* has been described by Mr. M. Mouraviev, who was sent by Russia as an envoy to the Khan, at great length, and he has given considerable interest in the deplorable tale of his sufferings. A barbarous nation, in the lowest state of civilization, can have very few objects to engage much attention; and if we except their peculiar manners and customs, and mode of warfare, they are entirely destitute of attractions to the inhabitant of a more refined atmosphere. Without antiquities, edifices, laws, learning, science, arts, and commerce, they have little to *satisfy* or *create* curiosity.

The Torkomans bear the greatest resemblance of all other nations to the Arabians; but they are not decorated with their antiquity of origin; their celebrity, as conquerors, as legislators, and as fanatics; their learning, and their reputed science. While the Arabian *Khaliffs* ruled as the *vicegerents* of Mahomed, the Torkomans were reckoned among the number of their slaves. Their manners are similar; they are equally the children of the Desert, inured to fatigue; pride themselves on their horses and mares; infest the high roads for the purpose of plunder, and enslaving their victims; war among themselves;

manufacture their own tents, clothes, and horse furniture ; tend large flocks of cattle ; move from place to place ; cultivate small portions of land ; eat horse and camel flesh ; and make distant excursions.

They differ from the Arabs yet in several points ; they are more wealthy ; they have less respect for their ancestors ; they have not that romantic sort of love for the other sex ; they do not hold the rights of hospitality to be so essentially incumbent upon them ; they are not so strongly impressed with the obligation of the law of *lex talionis* ; they frequently stain their predatory attacks with murder, which the Arabs always, if possible, avoid ; they are less subject to the vicissitudes of season, as they live in a more temperate climate ; they have a less defensible country, and have been frequently conquered ; they make captures for the purpose of selling them, and this forms their chief article of commerce with *Bokhara*. In their enterprizes they are bold, bloody, desperate, and cruel ; from their enemy they do not expect, and give no quarter, unless to make a slave of their adversary, for the purpose of disposing of him at the best market ; they murder the old men and women, and only take away with them such as may bring a good price, and reimburse them for their trouble ; they are more sordid, less hospitable and generous, and inferior in magnanimity to the Arab ; they have larger forms, fuller faces, broader and more expansive foreheads, smaller eyes, and are more ugly and cunning than the Arab ; they shew a few hairs where we expect to see beard ; large mouths, strong teeth, and moderate sized lips. Their cap distinguishes them from the Persian ; from bottom to top it is large and circular, of the same diameter, and not conical as that of the *Kassilbash* cut ; it is placed on an enormous head, seated on a short but thick neck, and this pillar is supported by a pair of broad shoulders, which gives the outline of a large and expanded body and a full chest. Their food consists of bread, soup, and pillao, diversified with cheese, milk, and fruits.

They generally eat twice a day ; their breakfast is light, composed of bread with fruit or syrup. Their dinner is more substantial, meat under some form always forming the chief portion of it.

The *Torkomans* are divided into a great many tribes independent of each other, who have their respective chiefs and white beards, (*suffed resh.*)

The country of the Torkomans may be considered, generally speaking, bounded on the north by the river *Ammoo*, and on the south by the river *Tedjen*; but these rivers wind very much, and perhaps it may be better to state the southern boundary of the country to be the Parapamisan range, and from thence north it extends as far as the *Ammoo* river. On the east, it approaches the confines of *Balk* and the towns of *Aukooree*, *Seripool*, *Shiberghan*, on the borders of the Desert. On the west the limit is distinct, it is the *Caspian* sea.

Khiva is the capital of a portion of this extensive country; but the more distant Torkoman tribes hold themselves, generally speaking, separate and independent of its rulers. *Orgunge* is the general appellation of this state on the north of *Khorassan*, and among the Torkomans of *Shurraks*. In ancient times this wild, desert, and inhospitable country would appear to have been inhabited by the tribes or races denominated the *Dahæ*, the *Getes*, and *Massagetes*, and the *Mimunceni*.

They have always been noted for their turbulent character and predatory habits, and for rearing that superb horse, which enables them to perform the most extraordinary journeys. The Sultans of *Kharizm* are famous in history. Malek Shah is represented as a noble, high-minded, and liberal sovereign; and the bearing and courage of Jillaladeen, the last sovereign of the Seljukian race, excited the enthusiastic praises even of Genjhis Khan, while he viewed him swimming his horse across the rapid current of the Indus, still continuing to let fly his arrows at him whilst landing on the bank of the stream, admiring his intrepidity. A king of *Kharizm* is mentioned by the historian Arrian, but he makes his residence west of the Caspian, next the country of the Amazons: this locality seems in my opinion evidently a mistake of the copyist.

The brave resistance and the frequent revolts of this people are mentioned by Arrian and Quintus Curtius.

The people of these countries, together with the Sogdians and Scythians, appear to have been the first who checked Alexander's career. The above-quoted historians allow that his detachments were often surprised and defeated; his campaign in this country would seem to have been very harassing, the labour and sufferings of his soldiers

very great. It is scarcely to be expected from posthumous historians that in relating the transactions which occurred in a distant and nearly unknown country, where a different language prevailed, that the correctness of their geographical information should be such as to enable us to trace with minuteness the various cities and petty kingdoms which they have occasion to mention at the distance of two thousand years.* It is with difficulty we can even guess at the principal places reported by these historians of Alexander the Great to have been subdued by him.

One of the most interesting places to inquire the situation of, it appears to me to be the hill fort, which seems to have been occupied by the Sogdians. This I imagine is no other than the *Killat Nadir*,† which very accurately corresponds with the description given of it by Arrian and Quintus Curtius. The names of nations and cities are very much confounded together, and this would appear to be the case with the Sogdians, Scythians, and Bactrians.‡ This rock may perhaps be thought likewise to answer to that of *Aornas*, since travellers have in vain inquired for it on the banks of the *Indus*; for Arrian says, that Alexander leaving *Herat (Aria)* went to the cities of *Aornas* and *Bactria*. *Killat Nadir* is situated on the borders of the Desert,

* With reference to the above, the following are submitted; some of them I have endeavoured to settle:—

Drapsaca? Budukshan.

Margiana. Marghina, the valley of the Moorgab river and the territory adjoining.

Nantaca? Sogdiana.

Drangæ? People inhabiting one of the mountain ranges of the Parapamisan spine. They are characterized by Quintus Curtius as “*Bellecosa Nazione*.”

Dai. The Cashgar people inhabiting the Western hills as far as Darwas. These hills are called the “*Beeloor Tay*” I believe.

Mæotis. The lake Aral.

Paratucas?

Choriensis Petra? This is perhaps the present Kellati Nadir in Khorassan.

Nicæa sacro?

Thyrceas?

Ara Sacos? This may be conceived a place of worship of the Sacæ, who were a tribe of Scythians.

Jenippa? Is represented a vastly rich and populous country, which attracted, by its fruitfulness, settlers from all parts. This territory was situated on the borders of Scythia and would correspond to the present Fergana.

† Vide B. Frazer. It is situated north of Meshid, on the borders of the Desert.

‡ These are described as all horsemen who exercise the profession of plunderers even in the time of peace. The Torkomans of the present day are now more barbarous in their cruelties, if possible, in quiet times, than during war.

north of *Meshid*; it is perhaps as strong as any hill fort defended by natural works can possibly be. It has all the advantages of scarped rocks, which form an invincible barrier to an enemy, and must be nearly impregnable to a force destitute of shells. It has, moreover, extensive pasturages and cultivated fields, together with water in great abundance, which probably would never fail. Of all natural defences this is the strongest situated within or near the Torkoman Desert. In this stronghold an army of many thousands might remain secure against every attack of their enemies. It has three gates, one on the north, another on the east, and the last on the south; by these alone it can be entered.

The same mode of warfare, and the same manners of these wild tribes exactly tally with those given by Arrian and Quintus Curtius. *Omnes equites, etiam in pace latrociniiis assueti, tam ferocia ingenia non bellum modo sed etiam veniæ desperantes asservant.** Their perfidy, villany, and barbarity, are as conspicuous now as in the days of Alexander. The Torkomans and the Usbecks are guided by the same principles and sentiments; are the same lawless, restless, and ungovernable race as the Sogdians, the Dahæ, the Massagetes, and the Scythians. The introduction of the religion of Mahomed has wrought little change in their morals, manners, customs, and socialities. Attached to no principles of moral rectitude themselves, they cannot conceive the existence of them in others. From their infancy accustomed to wander and to change their abodes; habituated to scenes of violence and bloodshed, in the perpetration of which no justifiable reason can be assigned, and restrained by no sense of order, reason, and humanity, they aspire to independence, and shun all subjection, whether of a moral or physical nature. Self-defence and preservation are their first consideration; self-aggrandisement and self-exaltation, the next; and in pursuit of this latter object, any and every means, even unto parricide, fratricide, infanticide, and regicide; but even the magnitude of such crimes are exceeded, frequently in the extermination of whole communities of people and extirpation of nations.

The *Oxus* is a river of considerable magnitude; it has a course of upwards of nine hundred miles from its source; its width and depth have not been exactly ascertained, it is however considered unford-

* Quintus Curtius, p. 231.

able, and has no bridges. The latest traveller, Mr. Moorcroft, found no difficulty in passing it; but unfortunately he omits to state in what manner his passage was effected. The main stream of the *Oxus* is formed of two branches. The right branch is called the *Ping Diria*, and the left branch, which comes from *Baduckshan*, is joined in its course from the *Hindoo Cosh* by several streams, and unites with the *Ping* river near *Hazerut Imam*.

Generally the *Ammoo* or *Oxus* is represented as a muddy, rapid, deep, dirty and sand-bearing river, and to travellers from Persia the largeness of the stream, and the quantity of water, is considered as somewhat wonderful, and they can only compare it with the *Tigris* or *Euphrates*. Mr. Moorcroft thinks it might be rendered navigable* from lake *Aral* to *Baduckshan*; in support of this supposition it is said, that Nadir Shah directed a thousand boats to be made and prepared for transporting his troops from *Baduckshan*, (or rather *Khundooz*), to *Bokhara* and *Kharism*. According to Mr. Moorcroft, boats might be towed up by horses; that horses for draught might be easily obtained at a small expence; but before this could be put into execution, some knowledge of the banks on either side seems to be requisite. Alexander found it a difficult matter to cross: he could get no materials of which to construct a bridge, and was obliged to adopt (then as it is now in many parts) the practice used in the country, of making rafts by means of blown skins, the buoyancy of which had the desired effect; several rafts thus constructed were sufficient to enable his army to pass this river in the course of five or six days. The Torkomans and the Allemanee† are in the habit of swimming their horses across. The subsidiary branches are frequently crossed by individuals on cows, where the stream is very rapid. There are various contrivances for passing it in different parts of its course, to which the natives are habituated. The *Cabool* river is passed by

* The *Ammoo* has never been navigated; but as far as I can judge from personal observation, there exists not a single obstacle formidable to its navigation. In respect to barks of large burden especially, if conducted by a steam apparatus, and if objections not foreseen should apply to its agency, I can discover no more against tracking than apply to the Ganges, with a superior advantage of the command of as many horses as would possibly be required for that purpose, at a very low price.—Mr. Moorcroft's MS. letter from *Bokhara*.

† The name of the gangs that go out forays.

means of blown cow or buffaloe skins, which are fastened to a slight raft of twigs. These rafts are called *jallahs*; they are very troublesome to manage, and dangerous, and accidents often happen. While the baggage and owners are thus ferried across, the cattle following each other swim to the opposite side. The *Oxus* is frequently frozen over; when this is the case, it can be crossed upon the ice. It abounds in fish, but we do not know that fishing is an occupation much followed by those who reside on its banks. Before it reaches the *Aral* it would seem to be divided into several streams, besides those canals which have been cut for the purpose of being conducted to remote spots of cultivation: the principal towns situated on these divided streams are *Oorgunge*, *Khiva*, *Toorbat*, *Suggur*, and *Sulughan*;* but these are probably little better than large encampments, except *Khiva* and *Oorgunge*, which are walled, and have ditches; but these defences are very miserable even in the opinion of the people of *Bokhara*. The southern bank of the river, and perhaps the other likewise, is covered for a considerable distance from the river with lofty reeds, which form a kind of forest, in which the Torkomans pitch their tents and feed their cattle; and I rather suspect that wild beasts also exist in these masses of reeds. Whence the ancients called this river the *Oxus*, as it bears no resemblance to the modern names, the *Amoo* and the *Jehoon* has not yet been ascertained. Mr. Moorcroft has offered a supposition, that that it is derived from the Turkish word *aksoo*; this appears to me a happy etymology, as it characterizes the river, the word signifying a white river.

The banks of this stream are much frequented by the Torkomans; they annually cultivate small patches to supply themselves with grain on this side of the river; the best and most approved horses are bred, especially the *karabay*, reared by the Torkomans. It is one of the finest castes which is procurable. The government of the Torkoman resembles that of a father over his family; each head of a family exercises absolute authority over its members; these consist of his wives, his children, his slaves, and such dependents

* At *Oorgunge* my informant left the banks of the *Oxus*, situated eight coss from the main channel. From this he travelled to the N. N. W. passing the towns of *Toorbat*, *Suggur*, and *Sulughan* on to the city of *Khiva*, situated on the banks of a large river called the *Heelem*, nearly as large as the *Oxus*.—Lieut. Macartney's *Memoirs*, see *Appendix to Elphinstone's Cabool*, page 648.

who are too weak or too poor to have separate establishments, submit themselves to his authority, and live under his protection. These dependents are frequently relations, or somehow connected by near or more distant ties of blood. The orphans and relations of other chiefs, who have died without leaving any heir of sufficient years to provide for their families, are also united to them by a remembrance of the friendship which subsisted between the two chiefs before one of them died ; and so long as they are treated with consideration, they seldom think of separating from the chief who has shewn them kindness and assisted them in their difficulties. Several heads of families form an *owl*, who unite themselves, and in conjunction make their annual peregrinations for the sake of pasturing their flocks, or for the purpose of proceeding to a distant spot near some river or stream, to rear their crops to supply them with grain. These migrations generally commence about the beginning of spring, upon the breaking up of the winter, when the snow melts and the weather becomes warmer ; at this period of the year, pasturage for the cattle is plentiful every where, and water is abundant. This is a season in which the Torkoman delights, and his flocks and beasts sympathise with him. They yield him their young, and a vast quantity of milk ; they become fat and sleek, and travel with alacrity to new pastures. It is at this time that parties are made up to go on forays ; one of these gangs generally consists of from twenty to sixty horsemen, well mounted and armed with swords and spears, and not seldom with matchlocks and pistols. Before hand, the object of their expedition is settled, which is generally to way-lay a *kafila*, or body of travellers ; on some occasions very large bodies are united to make expeditions on particular points of attack—such as on the frontier of Persia. *Meshid* was an instance of this a short time before my arrival in 1828. The Torkomans on this occasion joined several bodies of *Hazerahs* and *Jumshidies*, to ensure the success of the expedition ; a quantity of booty was obtained, such as horses, mules, and slaves of different sexes. The attack having been made shortly after sunrise, when the cattle of the city had left it for the purpose of grazing, they found no opposition in driving them away, together with the captives.

The dress of the Torkomans in general consists of a pair of *pijama-hs* or *shelnars*, which are fastened at the ancle ; over these they wear

a pair of high boots, which reach to the knee, commonly made of red Russian leather; for a shirt they wear next their skin a *perahan*, (tunic); over the *pijammahs* and *perahan*, they wear a *chogha* or cloak with sleeves, which is fastened by a slender *kummarbund* made of cloth or leather, to which is attached two knives in a case and a small purse. Above the under *chogha* they often put on a second, which is allowed to remain loose pending from the shoulders. On their head they have a black lamb-skin cap, with the wool of a jet colour and naturally curled.

The shape of this cap is not of a conical form as that of the Persians. Its diameter is the same at the top as at the part which immediately encircles the head.

They always wear a sword, (*shumsheer*,) which is either carried in the hand or fastened to the waist. They seldom wear a *peshkubz*. Their *choghas* are made of some blue cloth in the warm months, and of coarse woollen cloth in the cold season; the latter are either grey camel hair, coloured or black. The women are remarkable for wearing lofty turbans; they are fond of silks and splendid colours for their dresses. When young, their hair is allowed to grow long and unconfined, divided into plaits, to which are fastened behind small pieces of silver; some tribes wear their hair loose and exposed, others conceal it by turbans having loose locks hanging down. Their appearance has a certain rudeness, but not without something striking and interesting. The occupations of the men are predatory attacks; the chase; the breeding and the care, exercise, and instruction of their horses; tending their cattle; supervision of their slaves and their women, who are employed in making carpets, musnuds, (or felts,) loose furniture; overlooking their fields, and directing agricultural employments, and ploughing, sowing, and reaping; the setting up, taking down, and loading their tents. They are more accustomed to command than to obey. They exact implicit obedience from their wives, children, and dependents of all kinds. Their amusements are few. They like music, warlike anecdotes, breaking in their horses, exercising themselves in the use of the sword and the lance, and sometimes in using the matchlock. They delight in feasts and the pleasures of the table. They chase deer with an excellent breed of grey-hounds. Their women are employed in house-

hold duties, often have separate tents ; subject to them are female slaves, who act under their orders ; they prepare the ordinary food of the family, wash the linen, make up clothes for their husbands and themselves ; churn and make the coagulated milk and cheese ; bake the bread, and bring the water from the rivulet or fountain ; they assist in erecting the tents, in laying down the *nummud*, and cleaning the floor. They do not cover their faces with that scrupulosity that is practised in Persia ; they do not hide their faces except from newly-arrived strangers ; their manners are free and unconstrained ; their duties compel them to be much exposed to the climate. They are fond of singing and sometimes dance, particularly at marriages. I found them kind in supplying my wants ; both the men and the women are much given to pass their time in idleness and listlessness, and require much excitement to rouse them to action. In physical appearance the Torkomans are very muscular, large-bodied men ; they have very thick short necks, enormous heads with a broad front ; they have scanty beards which seldom exceed a few straggling hairs upon the chin. In their manners they are rude ; in their eating dirty and uncleanly ; their victuals are often imperfectly dressed by fire ; they are fond of animal food ; eat goat's flesh, and that of any animal which they can obtain.

These notes, (written in 1830,) were kindly placed at my disposal by Mr. Stirling, and are the result of that gentleman's personal observations during his travels in a part of Asia, little known in 1828. He has also obliged me with papers on Bokhara and Kothan, which will appear in their course.



Discovery of Coal in a new site. By W. DUNBAR, Esq. Assistant Surgeon, 5th Irregular Cavalry.

Camp Burree,
22 miles from Hazareebaugh,

In marching about a week ago from *Dorunda* to *Hazareebaugh*, I halted one day at *Bullea*, a very considerable village about fourteen miles to the south of the latter station. Having heard reports that there was coal to be found in the vicinity, I requested the *Kotwal*, a very intelligent and obliging man, to show me where it was, we proceeded a mile up the banks of a considerable nullah, called the *Haharoo*. The soil appeared to be mostly alluvial, containing in some places a good deal of *kanker*. The greater part was cut into rice *khets*. On the banks of the *Suncheraite*, a small nullah running into the *Haharoo*, I first saw the coal in a bed about three feet in thickness, with a gentle dip or inclination to the west. It was splintery, very black, lying below a friable sandstone, and alluvium containing *kanker*. The bed seemed to be of great extent, and I have no doubt that any quantity of coal can be procured at this place. I brought some specimens with me to my tent, and found that those from near the surface did not burn well; in fact it was with some difficulty I could get them to ignite at all. The others burned very well indeed, without a great deal of smoke, and leaving an inconsiderable quantity of ashes. The coal bed seemed to have been never worked, and I had some trouble in clearing away the grass and bushes, to procure the specimens which I took with me. I have some of these still in my possession, and regret that I have no opportunity of forwarding them to you at present, for the opinion of better judges than myself.

At *Bullea* there are large and very extensive iron works, employing a great many persons, and yet strange to say, though most of the inhabitants are aware of the existence of this extensive coal bed, they never use it for their furnaces; but are at great expense in transporting wood and charcoal from the forest, several miles distant. I endeavored to impress upon some of the workmen how advantageous it would be, and what a saving would accrue to them, were they to use this coal; but by

their answers, they evinced their utter indifference to the subject, and their determination to adhere to the customs of their fathers. The coal bed is not above a mile distant from the works.

The village of *Bullea* is very prettily situated, and the view from it in every direction very picturesque. Towards the N. W. and at a distance of three or four miles, is a semicircular range of hills called the *Mahoodée Pahar*, very much resembling, though scarcely equalling in altitude the Salisbury Crag, at Edinburgh; that is to say, there is a steep *talus* (formed in a great measure to all appearance from debris, which have fallen from above) of 200 or 300 feet elevation, and then you come on a steep precipice, which it appears impossible to scale. The *Haharoo Nuddee* winds in beautiful meanderings along the base of this high range. Hilly ranges of considerable altitude surround the plain on which *Bullea* is situated, and I regretted much that I had no time to examine their formation, or even to visit the *Mahoodée Pahar*, which was not very far distant from my camp. In a commercial point of view, little or no importance can be attached to the discovery of coal at *Bullea*, at least in the present day. It is near no navigable river; no public works of any importance are in its vicinity, excepting the iron works above alluded to, and it will require more than persuasion I am afraid, to induce the natives to abandon the use of wood and charcoal, for a cheaper and more useful material. The roads passing over steep and rocky ghauts, are by no means in a good state, though it is to be expected, owing to the exertions of Major Ousely, Governor General's Agent, that they will soon be much improved.

[This paper was communicated immediately on its receipt to Government, but having been subsequently mislaid, has not appeared at an early date as it should have done.]

Succinct Review of the Observations of the Tides in the Indian Archipelago, made during the year 1839, by order of his Excellency the Governor General, of his Netherlandish Majesty's possessions, 20th October, 1838. No. 3.

[This interesting report was transmitted to the Asiatic Society by the Society of Arts at Batavia. It has been translated for the Journal from the original Dutch, by my friend Dr. Roer, the translator of Lassen's Points of History.]



The tides have been observed at Pulo Chinco on the West coast of Sumatra to the southward of Padang, from the 10th February 1839 to the first of January 1840, being ten months and three quarters, by the naval lieutenants of the second class, G. J. Fabricius and J. de Hoon.

At Muntok on Bornea, from the 15th January 1839 to the first of January 1840, being eleven months and a half, by the naval lieutenant of the second class, P. C. Reuchenius.

On the Island Onrust near Batavia, from the 1st January 1839 to the 1st January 1840, being twelve months, by the naval lieutenant of the first class, Director of Onrust, J. Sigtoel.

At Fagol, on the north coast of Java, from the 1st January 1839 to the 1st January 1840, being twelve months, by the naval lieutenant of the second class, F. J. E. Van Goreum.

At Klampsis, on the north coast of Madura, from the 10th February 1839 to the 1st January 1840, being eleven months and three quarters, by the naval lieutenants of the second class, J. A. K. Van Hasfelt and J. Van Gool.

At Filatjap, on the north coast of Java, from the 1st of January 1839 to the 1st January 1840, being twelve months, by the naval lieutenant of the second class, J. A. G. Rictoeld.

To these have been added some less complete observations on Amboyna, from the 23rd March 1839 to the 1st January 1840, being nine months and a quarter, by the master, J. Kecutebol, and the naval lieutenants of the second class, J. A. Ricffer and J. A. W. High.

At Taparo, from the commencement of May 1839 to the close of December, 1839, by the assistant resident of Tapora, Winkelman.

Also on the Coriman Islands, from the 18th July 1838 to April 1839, by deputy of the civil service, Michalosske.

These two latter observations were forwarded by the favour of the Batavian Society of Arts and Sciences, which had already previously made (at the request of Prof. Whewell, Trinity College, Cambridge) some communications with regard to the tides in this Archipelago, to the Asiatic Society in Calcutta ; besides these, there were some observations made at Macassar in the year 1840, by the master in the navy, E. Lagto, after they had been finished at the other stations.

These observations furnish the following results concerning the respective stations:—

At Pulo Chinco off Fjinks, West coast of Sumatra. The course of the flood tide and the rise of the water on the coast was observed to run from N. E. to S. W., closely following the direction of the coast.

The ebb tide ran in the opposite direction, and though both tides were very trifling, not exceeding a quarter of a mile, yet the force of the ebb generally exceeded that of the flood, though neither were sensibly influenced by the wind.

The tides were, however, very regular. The mean duration was about six hours and a quarter, so that as usual, there were two tides in a day.

At new and full moon the high water was generally between 5h. 30m. and 6h. 30m. viz. At new moon. A. M. at 6h. 24m.

P. M. at 6 30

At full moon. A. M. at 5 28

P. M. at 5 35

average time about 6—00, and the time of flood tide during the other days, followed the common rule, dependant upon the moon's passing the meridian, according to which, though not always with the same regularity the tide came in every day generally about three quarters of an hour later, or rather in the course of a fortnight the variation amounted to twelve hours. If then six hours be supposed as mean number, it was almost always flood tide when the moon was in the horizon.

From the time of high water to the time when it again turns to ebb, as is here noticed, we may be allowed to fix 5h. 30m. as the mean number.

The mean rise and fall was about ebb,	...	...	0	78
The greatest ditto ditto,	...	...	1	49
The smallest ditto ditto,	...	...	0	6

The difference in the elevation of the succeeding tides is remarkable, viz. a greater rise and a smaller one were perceived to take place alternately, and in the same manner also the ebb tides.* This alternation of flow and ebb which is very regular may hereafter be shown to be in connection with the moon's decrease, though perhaps more so at this place than at the other stations of the Archipelago.

The greatest difference between high and low water, as well as the highest rise, occurred in October and November, and generally in the months when the West monsoon prevails.

At Filitjap, South coast of Java.

On the south coast of Java the tides were most regular in all respects, consequently the observations made upon them are best adapted to furnish a general rule.

The course of the flood tide was to the West into the outlet, and followed the direction of its shore. The ebb tide ran in an opposite course. In the westerly passage or creek of Segara Anakon, the tides had a course quite the reverse; here the streams met consequently the rise and fall took place without stream. In general the stream appears to run, at least in the East monsoon, along the coast to the East, at the rate of half a mile in four hours. In the straits of Filitjap in the West monsoon, the ebb and flood tides ran at the rate of two and three miles, and in the East monsoon at five and five and a half miles. The tides evidently follow here, as well as at Pulo Chinco, the common rule. The mean duration of rise and fall was about six hours and a half, and this took place with much regularity, two tides in one day; but also smaller rises and falls between the usual ones have been sometimes noticed, amounting to 0-20 ebb. The duration of still water is here very regular for ten or fifteen minutes after high and low water. The ebbs and floods are about equal in force and duration. At new and full moon the mean time of the flood tide was between eight and nine hours, viz.

*NOTE.—A nautical friend has pointed out that night tides are generally the highest, thus giving an alternation.

At new moon at. 9h. 18m. P. M.

and at 8 53 A. M.

At full moon at 8 45 P. M.

and at 8 19 A. M.

Average of the time 8 48

and therefore as the time of flood tide is noticed to the moment when the water again commences to decrease, we may fix here, as mean number, 8h. 30m., considering that here also the period of the flood tide during the fortnight passed the space of 12h.

At this station was observed the same remarkable fact as at Pulo Chinco, that at new moon it was high water an hour later than at full moon.

The mean rise and fall of the water was 1. 25 ebb.

the greatest 2. 42

the smallest 0. 10.

The greatest difference in the rise and fall of the tide took place some days after the new and full moon, not however exceeding 2.63 ebb. The highest water mark was observed in the East monsoon.

The difference of the rise and fall of the succeeding tides is here very notable, and appears more than elsewhere to be in connection with the decrease of the moon. The morning and evening tides are different, especially at the decrease of the moon, while they were about equal at the time of the moon's passing the Equator.

At Amboyna.

Although the streams in the bay are not strong, and sometimes only run from two miles to two and a half, and the turns of the tide very irregularly take place, we may state that the stream of the flood tide in the East monsoon runs into the bay along the northern coast to the E. and runs out along the southern coast to the S. W. The opposite course takes place in the West monsoon, while in the middle of the bay little or no stream is observed.

The duration of the rise and fall of the water is here very regular, about six hours and a quarter, so that the flood occurs about twice a day, and in a fortnight loses about twelve hours.

At new moon the mean time of high* water was about

A. M. 0h. 34m.

P. M. 0 46.

At full moon A. M. 0 06.

P. M. 0 38.

Average of time 0. 30. or 33m.

The month of December makes an exception to this, and might encourage the supposition of another mean number during the West monsoon, unless the observations made in that month exhibited a want of accuracy, on account of which they are not to be relied on.

At new moon here also, as well as at Filitjap and Pulo Chinco, the flood tide appears to come in always later than at full moon; the mean rise and fall was about 1. 14. ebb.

The greatest ditto ditto 2. 50. ebb.

The smallest rise observed at several places was scarcely perceptible. A small rise was alternately taking place with a great one, and the same occurred with the fall. The difference of the succeeding rises and falls is here likewise deserving notice. The greatest difference between high and low water took place in April and July.

The highest water mark was in April, November, and December. These remarks are made on observations taken during the period from April to December, and especially during the East monsoon.

At Klampsis, on the Northern coast of Madura.

It appears from the observations that were made, that there was no flood or ebb stream perceptible during the East monsoon, and in the month of May the stream had always during the day a Westerly direction, with the velocity from two miles to two and a half; while at night little or no stream was observed; it sometimes likewise ran to the East. The month of July forming the only exception to this, when in the night also the stream ran to the West, with a force of about two to three miles. In this monsoon the water is generally falling during the day and the stream then strongest, while during the night the water is generally rising; the stream however has little force.

These facts suggest the inference, that if ebb and flood tide here actually exist, the ebb tide has a Westerly direction, while the flood runs

to the East; this latter, however, is almost annihilated by Easterly winds. In the West monsoons, the stream runs to the East with little force, and the water rises during the day; the flood stream should accordingly run in this season to the East; but then at night scarcely any stream is perceived, and the ebb tide which then runs, was observed to be annihilated by the Westerly winds.

*East Monsoon.**West Monsoon.*

	←— Wind E.	—→ Wind W.
During the day fallg.	Stream during the day or ebb.	During day —→ Stream during the day flood
Night rising ←—	Stream during the night or flood.	Night falling —→ Stream during the night ebb.

The mean duration of the rise and fall of the water is during the whole year eleven and half to twelve and half, so that here ebb and flood occur only once in the same day; nevertheless it appears that here often little rises and falls, or those called short tides, have obtained alternately with them. It is worth noticing, that during a certain period the flood tide always took place before noon, and during the remainder of the year in the evening; namely, in May, June, and July the time of flood tide was daily in the morning about nine o'clock, and one o'clock in the afternoon, without regular yet constant retardation; this period from time to time suddenly shifting to an interval of six hours. In the first half of August, this period occurred between half-past seven and half-past eleven A. M. In the latter part of the same month, between half-past five and eleven A. M. In September between one o'clock and half-past ten A. M. In October between midnight and six o'clock A. M. In the latter days of November between nine o'clock A. M. and midnight. In February between three, half-past three, and half-past eleven o'clock P. M.; and so on, until in May this period again occurred before noon.

Thus it can be proved that in the E. monsoon, the flood tide took place always before noon, and therefore the fall of the water and also the ebb was during the day; and in the West monsoon after noon, so that the fall of the water and also the ebb were in the night, while the opposite was observed with regard to high water and the flood tide, as the mean interval from the period of the one flood tide

to that of the next was about twelve or thirteen. The succeeding tides, or the duration of that of the rise and fall generally decreased in an inverted arithmetical progression from between nine to fifteen hours; the difference between the rise and the succeeding fall of the water was most remarkable at new and full moon. There has been a single instance, in which the duration of the fall did not exceed an hour, while again a rising of three-quarters of an hour has been observed.

The sum of the two succeeding tides, or the duration of the rise of the water and the succeeding fall, always amounted to somewhat more than twenty-four hours.

This was not the case as regards the height of the tide and of the succeeding fall, which was almost constantly equal.

Here also, as elsewhere, it is notable, that a great rise and fall occurs alternately with a small one, and the difference in the rise and fall decreases till no longer perceptible, when it again increases, which phenomenon must (at least at the first glance) be accounted for as the effect of a powerful cause; as for instance, the decrease of the moon as has been already done.

The common rules are here also not sufficient to calculate the time of high water. It also deserves notice, that at new and full moon the flood tide generally, excepting some instances in October and April, came in between eight and ten o'clock, viz. the morning, when the afore-said periods in which, according to the season of the year, the flood tide must take place, corresponded with the morning, that is in the East monsoon, and in the evening, when the converse took place, that is in the West monsoon.

The flood of eight or ten o'clock, whether in the morning or in the evening, took place in almost all periods, as above mentioned.

The period of the flood tide at new and full moon cannot, however, be averaged or used to calculate the mean time of high water for another day.

The mean rise and fall of the water was,... 1·12 ebb.

The greatest, 2·13

The smallest, 0·11

The greatest difference between high and low water occurred in May, June, and December, after new and full moon, though this by no means was always the case.

The highest water-mark was likewise observed about this period.

At Fagol, on the north coast of Java.

It appears that here also, as at Klampsis, no streams of ebb and flood, strictly speaking, are to be found, the tides generally being very irregular, and the streams, which seem to be dependent on the wind, at most amounting to a quarter or half a mile.

The duration of the rise and fall has a singular course. In January it is sometimes six hours, so that there accordingly flood and ebb tides occur generally twice in a day; and only one rise and fall of much longer duration than ordinarily is perceived at new and full moon. In the succeeding months, these longer tides repeatedly occur after new and full moon, so that at this period, for several succeeding days, the flood tide comes in but once a day, and thus also the ebb, and the duration of the rise and fall of the water is respectively twelve hours. In May, about new and full moon, they continue for eight days, and likewise the whole month of June the duration of the ebb and flood tide is respectively twelve hours; so that there is but one flood and ebb tide during the day.

Then again in July, at new and full moon, there are tides of about six hours' duration, so that two tides again occur in a day.

In August and September, the number of days when short tides are perceived, is increasing. In October, the duration of all tides is about six hours, and in November and December, at new and full moon, they again come in some long rises and falls.

At the period of the change from these common or short tides (of about six hours) to the long ones (of about twelve,) a great rise and fall generally is alternate with a small one, and it is a remarkable fact, that these smaller rises and falls gradually decrease until they entirely disappear, and only one rise and fall takes place in the twenty-four hours.

The reverse was the case on the change from long tides to the common or shorter ones.

The same also appears to happen as regards the time of rise and fall, though in a less striking degree.

The time of flood and ebb tide is here likewise very uncertain. It may, however, be stated, that at new and full moon, the ebb tide comes in about three o'clock in the morning, while it is more regular with regard to

the flood tide, and it is therefore impossible to calculate with exactness, the other days re-appearance of ebb and flood tide at Fagol.

The mean rise and fall during the year was, ... 0·50 ebb.

The greatest, 0·97

The smallest, 0·04

The greatest difference between high and low water was observed in the West monsoon, and scarcely ever at new or full moon ; so that there accordingly existed no real spring tide : it never exceeded the fall by 1·03 ebb.

The highest water-mark, on the other hand, was in the East monsoon, especially in the months of May and June.

The difference in the rise and fall of the succeeding tides is here, as well as at the other stations, deserving notice ; and though the equality of the succeeding rise and falls evidently depends upon certain rules, yet it is not to be traced, at the first glance at least, to the decrease of the moon.

The monsoons, and likewise the stand of the sun's solstice probably, exercise a more than common influence on these tides at Onrust near Batavia. No stream of ebb and flood, properly speaking, was observed any more than at Fagol or Klampsis, the stream which runs cannot be subjected to any certain rule, nor does the rise and fall of the water proceed with regularity. The stream in all directions is much influenced by the wind, and is very trifling, seldom exceeding one mile to one mile and a half.

According to the observations that have been made, the duration of the rise and fall of the water in December, January, and February, was about twelve hours ; so that there is in one day, only once high water and once low ; sometimes, however, the water is longer flowing than ebbing.

In March for some succeeding days, smaller tides were observed between them, which being of very unequal duration ordinarily, were alternating in a short rise, succeeding a long one and vice versa. The recurrence of these small tides which first appeared twice or thrice in the month, may perhaps be brought into connexion with the age of the moon ; the number of days they continued decreased about July and August, though sometimes a short tide of one or two hours occurred ; with these exceptions, there was high and low water only once in twenty-four hours.

In the latter days of August, the number of days when the short tide comes in, it increases so that almost the whole month, as well as in September, two tides took place in the same days, though of a very irregular duration; then the number of days when the short tides were observed again decreased, occurring only twice or thrice in the month; till in December long tides almost always return, so that in this month there is only one ebb tide each day.

However, supposing in January and February the short tides have been overlooked, which is not impossible, as the character of these was not known at the commencement of the observations, or we should be able to assign a reason, that in July and December long tides, and in September and February short tides take place, as well as between these months, the number of days when short tides obtain, decreases and increases; something similar to this has been observed at Fagol; but the period of long and short tides does not correspond.

There is no peculiarity concerning the difference of the succeeding tides; but we must not omit to notice, that there, as well as at Klampsis, in December, January, and February, flood tide always comes in before noon, and this period is successively retarded; the flood tide being observed during May in the night; during June in the evening; during July and August in the afternoon; in September before and after noon; in October and November in those days where only one tide in one day took place before noon. It is evident from these facts, that during the East monsoon the flood-tide comes in the afternoon, and in the evening; while during the West monsoon it was before noon, and in the morning just the reverse of what has been observed at Klampsis.

The period of the flood tide at new and full moon, however irregular it may be in the interval between them, is always about ten o'clock, (or between 9h. 30m. and 10h. 45m.) P. M. from March to December, that is in the East monsoon; and at A. M. from September to March in the West monsoon, a singular correspondence with the observations at Klampsis. It is evident that on account of the regularity of the tides, this period cannot be used as a mean number, to calculate the period of the flood tide for other days.

The mean rise and fall was,	...	...	0·67 ebb.
The greatest,	...	...	1·32
The smallest,	...	...	0·02

The greatest difference between high and low water took place in the West monsoon, and then especially at new and full moon, in the other parts of the year. The position of the moon was not observed having any reference to the water-mark. The highest water-mark was also in the W. monsoon, and especially in December.

At Muntok in the Straits of Borneo.

At this place, a decided stream of ebb and flood took place, and the observations seem therefore most fit to establish on them a general rule for the tides within the Archipelago, and the short or middle tides. The flood stream at Muntok runs six or eight hours in a day to the S. E. with a velocity of quarter, half, and sometimes of one and a half mile, while the ebb stream runs sixteen or eighteen hours every day, at the rate of one or two miles to W. by N. and W. N. W. The turn of the streams was not regular, nor to be brought into connexion with the rise and fall of the tide. In August, an ebb was even observed lasting more than thirty-eight hours, while the water in the mean time rises twice.

After the monsoons, the common duration of the rise generally is ten hours, and that of the fall 14-30; afterwards at the first and last quarters of the moon, ebbs and floods, or the so-called short tides take place in one day, which last about six hours, or rather the mean duration of two rises is about 11-30, and that of two falls 12-35.

The short tides ordinarily appear at a certain suspension of the fall or rise in the ebb and flood tide, called by the natives *passing ketjil*. Should these tides amount to two ebbs and two floods in a day, they are called by the natives, "*passing onok*;" while ebb and flood, which run for a longer time, and precede the common tides of ebb and flood of twenty-four hours duration, bear the name of "*passing ma*."

On the contrary, during the change of the monsoons, that is during April, May, October, and November, these middle tides run at new and full moon; and here also as at Onrust, flood tide occurs during the West monsoon, in the afternoon and in the evening, and at new and full moon at 8h. 30m.

During these months, when at new and full moon short tides were running, the high water generally came in about 6h. 50m. in the morning, and at about 7h. 10m. in the evening. However, these numbers cannot exhibit a mean number, nor give a direction to calculate the high water of the other days, although the time of the flood tide, however irregular, seems daily to come in later, being retarded twelve hours in a fortnight, while this time on the appearance of the short tides has a most irregular course.

The natives foretell sometimes very exactly the return of the small and the short tides.

The greatest rise and fall was,	4· 26	ebb.
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The smallest,	0· 07
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The mean,	2· 17
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The greatest difference between high and low water was at full moon in December, in June, and May, and in general when the monsoons had passed; while the difference during the months, while the monsoons changed, was less perceptible.

The greatest rises and falls often took place at new and full moon, though by no means always.

The highest water-mark was also observed when the monsoons were in their full force. Besides it deserves notice, that during the period when flood and ebb tide came in only once a day, that is during the common long tides, the rises and falls following each other successively increase and decrease; while when two tides or middle tides occur in a day, the succeeding rises are alternately great and small, and thus also the falls, while the difference in the quantum of two succeeding rises, probably depends on the decrease of the moon.

At Corimon, Java.

An ebb and flood tide is here even less perceptible than at other stations. It appears, however, from the observations that were made, that here, as at Klampsis on the North coast of Madura, the stream runs especially with the rising water to the East, and with the falling water to the West; in the East monsoon in the night, in the West monsoon in the day time.

The tides are very irregular ; there being only once in a day flood and ebb tide, and sometimes of the duration from nine to fifteen hours.

The period of the flood tide has here, as at Klampsis and Onrust, a general though irregular retardation, viz. in the East monsoon, as at Klampsis, the high water comes in before noon and in the morning ; in September early in the morning ; in October, November, and December, in the night ; during the West monsoon in the night and in the evening ; in April in the afternoon ; while this period is most irregular during the turning months.

The mean rise and fall was, 1· 25 ebb.

The greatest, 2· 03

The highest water mark is in April, and generally the 21st and 22nd of the month.

At Tapara.

No ebb and flood stream properly speaking, and the whole course of the tides very irregular. With the rising water, a stream was generally observed having an easterly direction ; high water only once in the same day. Here also the period of the flood tide appears to undergo a general, though indefinite annual retardation, viz. the flood tides during the month of May and June take place after noon and at noon ; the ebb-tide in the morning and about midnight.

In July, August, and September, they take place successively earlier, so that the high water comes in October about half-past five o'clock in the morning ; in December about half-past one in the morning ; and during the W. monsoon in the night and in the evening ; and consecutively the flood-tides again occur in the afternoon. The period of ebb and flood tides at new and full moon is very irregular.

The mean rise and fall is, 1· 31 ebb.

The greatest, 2· 00

The highest water-mark was observed in October.

At Macassar.

According to some observations of a later date transmitted to us, viz. during the three first months of 1840, the tides are very irregular ; having a close correspondence with the tides on the Javanese sea.

The flood-tide, though with little force, runs to the N. E. and N.N.E. the ebb-tide to the S. W. and S. S. W. either stream much dependent on the wind.

During the full strength of the monsoons, there appears long tides to prevail, being only one flood and one ebb tide in twenty-four hours, and as at Muntok and Onrust, during the change of the monsoons periodically, returning short tides took place twice in a day; and during this period they were all short tides of about six hours. At new and full moon, the flood-tide comes in at about 6h. 20m. There is no daily retardation of the flood-tide. It appears, as at Klampsis, on the north coast of Madura, that during the W. monsoon the high water takes place in the afternoon, and most likely the converse during the E. monsoon.

A mean number cannot be obtained here.

The highest rise was during the 3 first months of 1840, 1. 60 ebb.

The mean, 0. 75

If we then compare the course of the tides at the different stations, there is evidently observed a sensible difference of the tides without the Archipelago, viz. of those on the West coast of Sumatra and on the South coast of Java and of Amboyna, from those within the Javanese sea. Here we are able to fix a certain mean number, by means of which the time of high water is to be calculated, totally different from the course of the tides within the Javanese sea.

The former it appears follow the well known rules of the tides; there is twice in the day ebb and twice flood tide, and two tides take place in the space of somewhat more than twenty-four hours in the whole, depending on the moon's passing the meridian.

Here we are able to fix a certain mean number, by means of which the time of high water is to be calculated beforehand, totally different from the course of the tides within the Javanese sea, which cannot be traced to the common rules; they rather are governed by the locality, the position of the sun, and the monsoons dependent on it.

We may however state, that in the Javanese sea high water is only once a day, and that besides these, long tides, or rather rises and falls, which of more or less duration last together somewhat more than twenty-four hours. Small or short tides prevail, whose very regular return depends on several causes, especially on the monsoons

and the sun's solstice. They may perhaps be subjected to a certain rule; because the natives of this Archipelago are able often to foretell with great exactness the return of the small tides.

Although (notwithstanding the irregular return of the hour of high water) at new and full moon at the same place, the tides generally return at the same hour; yet these cannot be fixed a mean number for the different stations upon this sea.

In general annual (although irregular) retardation of the daily period of the high water, which appears also to depend on the sun's solstice like the short or middle tides, is a singular character of the Javanese sea, or perhaps of all seas situated within an Archipelago.

Besides, it must be noticed, that the streams are still more irregular than the rise and fall of the water, and much depends on the prevailing winds.

Order.

E. LUCAS,

Rear Admiral, Commander of H. M. Navy

in East India, and Inspector of the Navy.

By order of the Rear Admiral, Commander of His

Majesty's Navy in East India, and Inspector of the Navy,

W. DE CONSTANT REBECQUE,

Adjutant and Naval Lieutenant.

General Table of the Tides in the East Indian Archipelago, on Observations taken in the year 1839.

Station.	Flood tide at full and change.	Duration of the rise and fall of the water or of the ebb and flood-tide.	Greatest rise and fall of the water.	Mean rise and fall of the water.	Flood.		Ebb.		Remarks.
					Direction.	Velocity.	Direction.	Velocity.	
Pulo Chinceo.	6h. 0m. 0s. Mean number, 5h. 30m. 0s.	Two tides in 24 hours, that is twice flood-tide and twice ebb, flood and ebb-tide about 6½ hours.	Ebb. 1-50	Ebb. 0-78	N.E. E.S.E.	Mile. ½ Little.	To the S.W. W.S.W. South.	Mile ½ Great.	The tides regularly lose 12 hours in a fortnight, the flood along the coast runs to N.W., the ebb to S.E.
Flatajap.	8h. 48m. 0s. Mean number, 8h. 30m. 0s.	Two tides in 24 hours, that is twice flood-tide and twice ebb; flood and ebb about 6½ hours.	2-63	1-25	W.	2½ to 4½.	To the East.	2½ to 5½.	The tides regularly lose 12 hours in a fortnight; the stream along the coast runs to the East during the East monsoon.
Port Victoria at Amboyna.	0h. 33m. 0s. Mean number, 0h. 30m. 0s.	Two tides in 24 hours, viz. twice flood and twice ebb tide; flood and ebb tide about 6½ hours.	2-50	1-14	In the E. monsoon to the S.W. in the W. monsoon to the N.E.	Little to 2½.	In the E. monsoon to the N.E. in the W. monsoon to the S.W.	Little to 2½.	The tides regularly lose 12 hours in a fortnight; ebb and flood run in an opposite direction along the North coast of the Bay.
Muntoh.	After the monsoons 8h. 30m., in the months when the monsoons change about 7h.	During the power of the monsoons generally one tide in 24 hours, viz. the rise of the water 14h. 30m. and the fall 10h.; two tides in 24 hours during the months when the monsoons change; between both on the return of certain periods; whether at quarter or at full moons the opposite course took place, and especially at the change from the long tides to short ones and vice versa.	4-27	2-16	During 8h. or 8h. E.S.E.	½ to 1½.	During 18h. or 18h. W.N.W.	2	During the East monsoon it is always high water at ½ p. m. or in the evening; during the W. monsoon a. m. or in the morning.
Onust.	In the East monsoon about 10h. p. m., or in the evening in the West monsoon about 10h. a. m. or in the morning.	During the full power of the monsoons generally one tide in 24 hours; the rise and fall about 12h. two tides in 24h. in the months when the monsoons change; between both new and full or at quarter, the opposite course took place at the change, from the long tides to the short, and vice versa.	1-32	0-67	Properly speaking, there is no ebb and flood tide stream.				During the East monsoon it is always high water at p. m. or in the evening; during the West monsoon at a. m. or in the morning.
Pagel.	Very irregular.	Generally one tide in 24hs. during the E. monsoons; two tides in 24hs. during the W. monsoons; between both at certain periods, at new and full moon, the opposite course took place; especially at the change from the long tides to the short ones, and vice versa; that is in the months when the monsoons change.	1-03	0-50	Idem.		Idem.		
Klampis.	East monsoons 9h. to 10h. a. m. or in the morning, in the West monsoons 9h. to 10h. p. m. or in the evening.	One tide in 24 hours, ebb and flood tide from 9 to 15 hours; there were no exact observations made concerning the existence of short tides.	2-13	1-12	Idem.		The stream generally runs to the Eastward on the rise, and Westward on the fall.		During the East monsoon it is flood tide always in the morning, and in the West monsoon in the evening.
Tapara.	Very irregular.	One tide in 24 hours, from 8h. to 16 hours; short tides were not observed.	2-00	1-31	Idem.		In the rise the stream generally runs Easterly, but it is very irregular.		During the E. monsoon the flood tide comes in the morning, and in the W. monsoon in the evening.
Ormon, Java.	East monsoons 8h. p. m. in the West monsoons about 8h. a. m.	One tide in 24 hours, from 9h. to 15h.; short tides were not observed.	2-03	1-23	Idem.		On the rise the stream generally runs Easterly, and on the fall Westerly.		During the East monsoon the flood tide comes in the evening; during the West monsoon in the morning.

N. B.—The mean rise and fall are here the average of the extremes, and the greatest rise and fall must be so taken in an absolute sense. If, however, the average of the greatest rise and fall of every month be taken, it is somewhat less. If the average of the mean rise and fall of every month be taken, it becomes somewhat more.

Order.

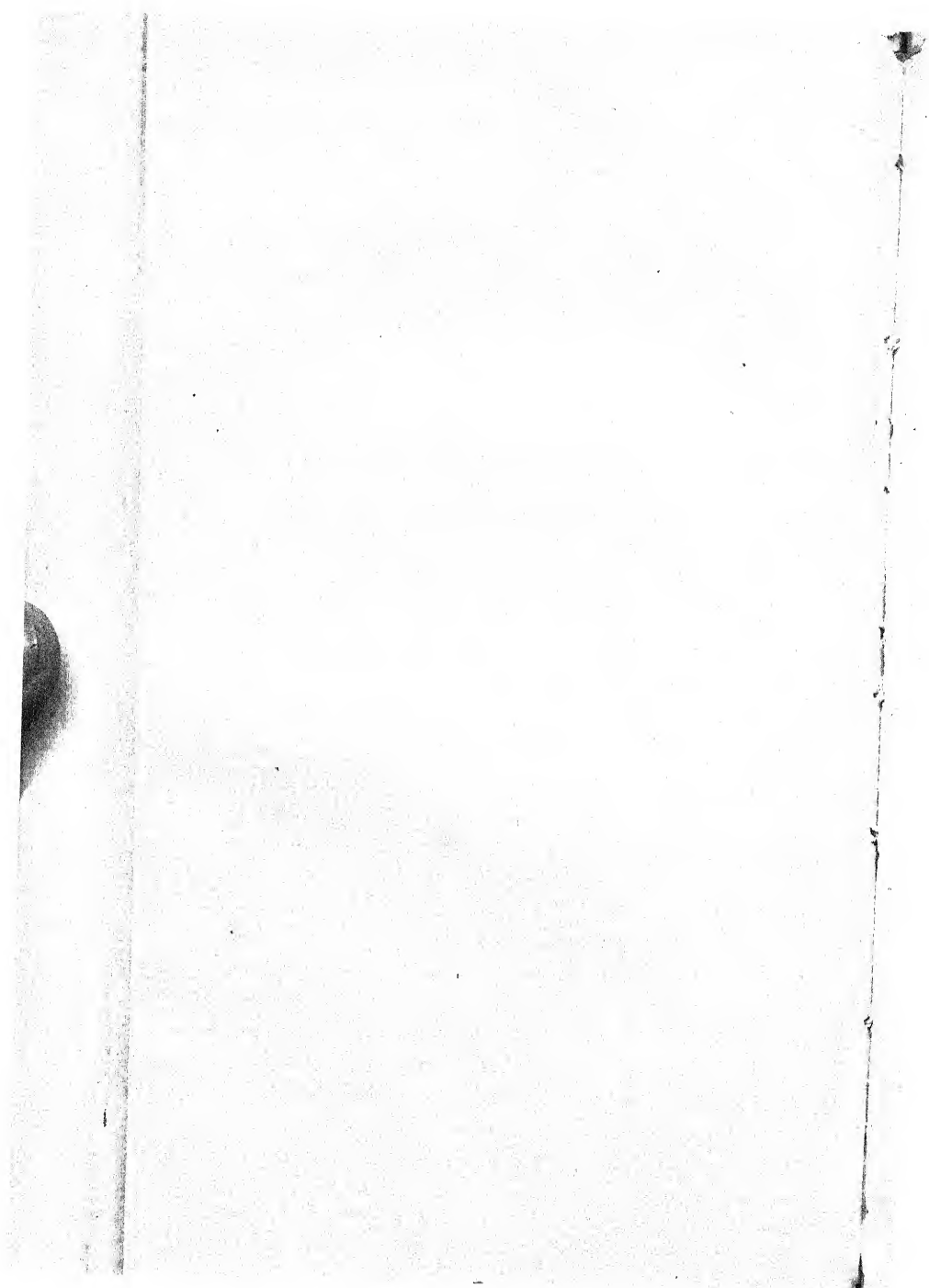
E. LUCAS.

Rear Admiral, Commander of the Navy in East India,
and Inspector of the Navy.

By order of the Admiral of the Navy in East India, and Inspector of the Navy,

W. DE CONSTANT REBECQUE,

Adjutant and Naval Lieutenant.



Journal kept while Travelling in Seistan. By the late Capt. EDWARD CONOLLY.

I left Herat on the 11th of August 1839 in progress to Seistan. All
 Leave Herat. the papers and credentials with which I had been
 furnished by H. M. Shah Shooja and Mr. Macnaghten having been stolen from me near Herat, Major Todd wrote out
 Papers stolen. a new list of instructions for my guidance, and
 Appendix 1. procured letters of introduction to the chiefs, through
 whose country I should pass, from H. M. Shah Kamraun and his
 Letters of introduction. Vuzeer Yar Mahomed Khan. He also gave me
 letters from himself to the several chiefs.

The vuzeer appointed two persons of influence and respectability
 to accompany me into Seistan, or as far as I might judge convenient; they were to receive no fixed salary; but I promised to
 Escort. reward them according to their services and utility.
 Both were accompanied by a few horsemen.

I had also as an escort, an Ishaukzye, named Sultan Khan, with
 six horsemen, who had been made over to me at Candahar by H. M.
 Shah Shooja.

The vuzeer sent me before I started a handsome horse, and what
 was more valuable, one of the five mules which were captured from the
 Persians during the siege. This animal was worth at even Herat 360 Rs.
 We reached Subzawar on the evening of the 15th; when about a mile
 from the town, we were met by a messenger from the governor
 Subzawar. (Syed Mahomed, a son of the vuzeer Yar Mahomed
 Khan,) who conducted us to a garden house, which
 had been prepared for our reception. On reaching this, we found
 seated, waiting for us, a Persian gentleman, a sort of mentor to the
 young lord; the Sheeghaussee, and several other well dressed persons,
 who repeated "You are welcome, you are very welcome," a hundred
 times; a *zeafut* followed of forty sheep, and attah, barley and ghee sufficient for my whole camp for six days. Till late at night, message after
 message came from the sirdar to inquire if I was tired, if my brains
 were clear.

16th.—This morning I was hardly up, before the sirdar visited me, with a long train of followers; he sat a fatiguingly long time, talking nothings. He talks so fast, that his servants even confess that they only understand half he says, and as he mingles a large proportion of *Pushtoo* with his Persian, I found some difficulty in following him: he has a pleasing appearance and manner.

I rode out in the evening; the town is a poor collection of huts, but in the fort are some twenty houses of Hindoos, who are perhaps the most contented of Shah Kamraun's subjects; not that they are better treated than the rest, but that the oppression to which they are subjected seems less, and tolerable in comparison with what they dread from *Sheah* intolerance, should the Persians gain the ascendant.

On my return home I sent my head Mirza, Mahomed Juher, to the newly-discovered Prince, with respectful messages, and an apology for not calling, on the plea of my being a traveller, having nothing fit to present, &c. The fact was, my *tosha khaneh* was not large, and it was necessary to husband my resources.

The prince at Subzawar is the youngest son of Shah Kamraun, and is named Zemaun. One of these princes is attached to every government under the rule of Shah Kamraun, to assist in the administration of justice, since no one but a Puddozye could execute a criminal without fear of retaliation. When the real governor wishes to punish an offender, he sends him to the prince, who, dressed all in black, in the robes of punishment, *poshaki gauzub*, himself superintends the execution; besides the more usual punishment of cutting off the ears and lips, slitting the nose, &c. tortures of several kinds have been common.

Syud Mahomed paid me another visit in the afternoon, as I had announced my intention of pursuing my journey to-morrow. He shewed me a letter from his father, begging that I would permit one Hubeeboollah Khan to accompany me to Seistan, that he might through my influence purchase grain, which at present he said, from Shah Pusund Khan's being unfriendly to him, he could not do. He also requested, that I would

make over any grain, I could buy on the public account to the same. To the first proposition I made no objection. Hubeeboollah I knew to be a man of character and respectability; he is an Ishaukzye, and son of the Mir Akbar of Shah Zemaun; and as he was well acquainted with Seistan, where he had lived for more than a year as the agent of the Herat government, I thought he might prove useful.

On taking leave of the governor I presented him with a pistol of

Present to Syud
Mahomed Khan.

small value, and a shawl, apologizing for the poor-
ness of the gift by repeating, what I had been re-
peating, since I arrived but without much effect, that

I was travelling as a mere private individual, and uninvested with political authority. Syud Mahomed expressed himself quite satisfied with the offering, and sent me two sorry horses in return; he also pressed a few more horsemen on me, as the road between Subzawar and Turrah was not accounted safe. As I was mounting my horse, a person slipped a letter into my hand and slunk away; it was from the prince, begging me to mediate with Major Todd, that his allow-

Letter from the
Prince.

ance might be increased, and wishing me a pros-
perous journey. Our road lay on the banks of the
river Adrascund, which shewed traces of having been

once richly cultivated; but at present they are covered with grass and

Leave Subzawar.

weeds, on which large numbers of sheep, camels,
horses, and cows were feeding. We made a detour to

visit the Killah Duchter, celebrated in the traditions of this part of the country; but were not repaid for our trouble. The Killah Duchter is a small ruined fort on the left bank of the Adrascund,

Killah Duchter.

where that river turns the hills, and on the extreme
edge of these hills is built, just opposite the other

fort a wall and parapet, now in ruins, with a high tower in tolerable preservation, and which is seen for miles. This last is the Killah Pisur, and the son and daughter used to nurse each other with mutual sieges. While we were sitting on the tower of the Killah Pisur, which commands a fine view of the plain below, we perceived a horse-
man trotting towards us from the town. It appeared that a boy, the

Runaway Slave.

slave of some person about the sirdar, had ran away
and had taken service with one of my followers. The

moment the horseman approached, the poor boy went without saying a

word towards him, and jumped up behind him; the man not even halting, turned his horse, and trotted back again to Subzawar with his reclaimed property; for there was no time to interfere if even I had the will to do so.

From Subzawar to Imanet, the villages are inhabited by mixed tribes of Duranees; but between Imarut and Jaigee, the population is entirely composed of Goorazye

Moorzye. We met on the road a pleasing sight,—some few Kheils returning from the south to re-settle in their old lands in Subzawar. The

Jaya. Dlehikzye Kheil, with whom I was so near being obliged to fight at Ahinuk, as related in a former report, had also just returned to their ancient habitations, laded it was said with spoils, of which a part was the Company's camels. I reported this last circumstance to Major Todd, not thinking the present a prudent time for me to stir in the matter.

At Jaya two gentlemen, who were travelling towards Laush on their private affairs, requested leave to accompany my party. One was the son of the old Moorzye lord, so well described by Mr. Elphinstone, Ahmed Khan; the other was a relation, Dost Mahomed Populzye, a person well known in the modern history of Herat; they both shared in the general ruin which has fallen on all men of rank under the rule of Yar Mahomed Khan, whose policy it has always been to allow the clans subject to Herat, to be without a head; so that there should

Joined by two Duranee gentlemen. be no one of influence in the country but himself and his immediate adherents. Though I could not but

fear that the two nobles came to beg, it was difficult to refuse giving them the protection they asked for, particularly as a few miles from Jaya we had a few hours before met two different parties who had been robbed by the lawless inhabitants of the hills. Their followers did not consist of more than eight horsemen, so we bid them all welcome, and assigned them their station in the camp, they agreeing to share in the fatigue of keeping watch at night, in which every person with me, of whatever class he might be, took his part. Our watches were not indeed kept with the silent decorum of a European camp, though perhaps in a manner equally effectual. Several parties

Night watch. of twos and threes sat round fires in different quarters, and kept themselves awake by singing songs,

verses of which were taken up by one party from the other; and by calling out to each other at the top of their voices, *hoshear*, "be watchful," every five minutes.

You leave the valley of Jaya by a narrow pass, which runs at right angles to it, and enter a barren plain called Baboor; as you approach the Bobehi Barran hills, you find the whole country covered with a beautiful grass, so that you may suppose it a meadow in England. But this grass, which is called *heertah*, has some property noxious to cattle, and is therefore useless. After this, you come upon the valley of the Purrah road, which was, and should be, one mass of cultivation; the banks of the river presented a lively appearance of green gardens, of villages, and fields.

We now crossed through miles of ruined walls, and did not meet one inhabitant till we were quite close to the town. When its desolate appearance. the Candahar sirdars retired, and the present governor, Futteh Khan, was sent to occupy the fort, a scene of desolation presented itself to him, which I cannot describe better than in his own words:—

"I went to the top of the castle, from whence there is an uninterrupted view for miles; through all the wide space below me, I could not perceive one human being or the smoke of a single fire." The few people he had with him actually lived on the grapes, which were the only things the Candaharees had not destroyed. They dried and made sugar from them, and sent them to Baudan and other places around, getting grain in exchange. We halted on the evening of the 21st on the banks of the river, about two miles from the town; the next morning Futteh

Mahomed Khan, who the evening before had been amusing himself with the *munzud bauzee* at a village some eight miles off, but who the moment he heard of my arrival left his betrothed to come and meet me, rode up with a few followers, and escorted me to a wretched mud house in the fort, which I afterwards learnt was his own residence, which he had vacated for me. After inducing me into my quarters he took his leave, and shortly afterwards sent me whole maunds of delicious grapes, a mule load of melons, and provision for four days for my party. People came in to know whether this was sufficient, that more would be sent, &c. A respectable person

Reception. was left to attend on my wants, who every half hour brought in a cup of tea and a *kullion*. In the even-

ing the governor called again, accompanied by the heads of all the Kheils around, who apologized for not having come out to meet me, as they had not expected me so soon. I disclaimed all title to such honors, but this they evidently considered as mere words of course. The room was so small that it was with difficulty all my guests could squeeze in. I had heard reports of Khyrmun Meerza having encamped outside Subzawar, and of his having sent to Shah Pussund Khan to desire him to get ready 60,000 *khurwars* of grain, as he was coming with an army. "I have written," said Futteh Khan to Shah Pussund to say, "that if he does any thing of the kind he shall repent of it." This flourish was amusing enough to me, who knew the relative situation of the parties. There was much talk of the Beloochee *chuppaing*, Beloochee plundering. and Juma Khan, the brother of the Ex-Candahar sirdar, was reported to have been stripped.

The many stories I heard of the boldness and strength of these plundering bands, and the assertion of several people, who pretended to have been well informed on the subject, that there was no grain procurable at Jorodine, determined me to leave eighty camels, (which I had brought from Herat with me for Major Todd to load with grain for the use of the mission,) at Furrah.

Determined to leave camels brought for grain at Furrah.

This measure, too, might disarm any jealousy Shah Pussund Khan might have perceived by my bringing these camels, which he might suppose were sent by his rival the vuzeer, and it would serve to counteract the prevailing notion of my being laden with gold, which caused all the beggars to collect around me from far and near. I was much annoyed with people rushing into my room with a large tray, perhaps containing one melon, or getting introduced on the plea of business, and then presenting a pair of gloves, or some such trifle, and begging for *shushkut*, which literally means Expensive presents. honor, and really money. As all the heads of Kheils had sent me presents of fruits, we had more grapes and melons than we could have consumed for several days. I asked Futteh Khan how to get rid of the nuisance, and if it was the "custom" for travellers to be thus taxed; he said it was all imposition, and mentioned as an example, that when the king of Persia rides out an order is given that no one should make an offering, I of course profited by the lesson. Beggars of this kind are sometimes very impertinent and exacting, and

will return the contra-donation, unless they think it sufficiently large. A villager brought a sheep to Shah Pussund Khan's father : ' Give the man a *choghlu*,' said the chief to his Nazir. The Nazir took off his own cloak and gave it. It was old and torn. The villager looked at it, turned it over, and putting it down at the Khan's feet, said, " Here, take your old *choghlu*, and give me back my sheep."

23rd.—I called on the prince Saudut-ool-Moolk, Futteh Khan having

Prince Saudut-ool Moolk. hinted to me that a present was not required. He

was seated in a small room in the citadel, and made me sit down beside him, without any attempt at formality. He was coarsely dressed, and had just the air of a *Buniah*. He is fat, short, and jolly looking, and talked much with a loud voice, smiling all the while, and this good humoured personage has lately seated himself on the road between Furrah and Girishk, and in company with his brother of Ghore amuses himself with plundering passengers. From the prince I went to

Governor's house. the governor, whose house was more wretched than my own. We walked out together to visit the pits, where they were making saltpetre, with which the whole plain of Furrah is encrusted.

The process of extracting it is simple ; a platform of wood and branches is thrown across a pit, and covered with earth scraped from the surface : this is wetted, and the saltpetre drips through into a reservoir below, from which it is ladled out into bowls, when it is boiled, and left to crystallize. The crystals are as clear and shining as amber. Any quantity may be made here ; but at present they only collect enough for their own consumption, from some foolish idea of its being dangerous to sell it to their neighbours, who are, or may be, enemies, chiefly from the general languor of commerce in this part of the country. When Shumsoodeen Khan was governor of Furrah, he is said to have exported it with much advantage to his revenues, Seistan for example affording a ready market. Nothing but common salt having as yet been found there, a little is still sent annually to that country from the pits. We ascended to the top of the citadel, and a more melancholy prospect it would be difficult to

View from the citadel. imagine ; of the fort I have sent a plan to Major

Todd. The walls are of considerable thickness, except in the S. W. face ; the inside of the fort contains only some

twenty houses with domed roofs built of mud, with the exception of perhaps three rather larger places, such as the one I lived in.

In the centre is a pond of stagnant water, which the inhabitants have not energy enough to drain off, though it is the cause of much unhealthiness, and numbers of people fall victims to fever and ague when the plain is inhabited. The rest of the fort is occupied by the mounds raised for salt-pits; some in use, others deserted. Round two or three sides of the fort were the ruins of the town, now containing no inhabitants, nearly all of them having fled to Laush. There were no Hindoos, no shops. You could not have purchased a rupee's worth of grain.

24th.—The sirdar proposed a *pic nic* to a celebrated Hindoo place of pilgrimage, called the Bebehi (a corruption perhaps of Bebe) Baran, *of the raining lady*, in the hills N. of the town, or and about twelve miles off. A spring from the heights above is discharged upon a large table rock, projecting from the side of the hill, through which the water filtrates, dropping like rain for a space of about fifty feet. The effect is very beautiful. On a small level space just above the dripping rock, a Hindoo *fakcer* had stationed himself, and supported by numerous pilgrims, who flocked to him, had lived there fourteen years. His visitors built him a very comfortable house of two rooms, and outside was a clear place for bathing, a space set apart for his cooking, and even a little garden. The Bebehi Baran is situated at the end of a gorge, which on the Persians raising the siege of Herat, the Furrahees fortified against the Candaharees, who had possession of their fort. The soldiers annoyed the hermit, or perhaps the earthen vessels for grain which are remarked round his chamber were not filled so regularly in those troubled times—he left his retreat.

I afterwards met him in Seistan; he was a young man still, not forty. He came to me, as a brother Hindoo, to beg the gift of five rupees, to take him back again to his old house, where he says he intends to pass the remainder of his days. I gave him what he wanted, and I afterwards learnt that he has once more taken possession of his house on the Bebehi Baran.

25th.—The two nobles who had accompanied me from Jaujer, sent to say, that if I would only feed them, they would follow me into Seistan; there were reasons for not

Unhealthiness of
Furrah.

Bebehi Baran.

Hindoo Fakcer.

Dismiss my two
guests.

acceding to this; one of which I may mention, that Ahmed Khan's son had some demand to make on Shah Pussund Khan, and he thought that his being in my suite, would ensure its being granted. I therefore declined the offer, on the plea of wishing to be as private as possible, and not to incommode my generous hosts with a larger camp than was necessary. I had been sending them a few sheep and grain and fruit out of the superfluity which Futteh Khan and others had forced upon me, and through Mahomed Taher, had intimated to them, that I had only money sufficient for the expences of the road. I now sent a parting present of food for two or three days, and consigned them, in the Afghan fashion, to God.

Mahomed Seddie Khan, one of the persons sent with me by Yar

Mahomed Seddie
Khan dismissed.

Mahomed Khan, had been since our arrival at his home, a village not far from Furrah. I learnt to-day by chance, that this man had a blood feud with the

chief of Toojk, a place we have to pass on our road to Laush. I immediately dispatched a letter to Mahomed Seddie, telling him that he must take his leave of me here, and requesting him to send me some servant, or to come himself, for his *khillut*. The *Cossid* brought back a reply, that Mahomed Seddie was coming in person to answer my letter. This evening we heard from a traveller of the flight of Dost Mahomed, and the occupation of Caubul.

The governor called to wish me good bye, as I was to start for Laush in the morning. I gave him some gay pieces of cloth, which I heard would be acceptable to him, for the lady he was courting; he sent me a horse worth about fifty rupees. Before he took leave, he ordered his attendants out of the room, and begged me to intercede with Major Todd in his favour, that he may not be turned out of his government. "I have no heart now," he said, "to make any improvements; for the moment I have made the appointment worth holding, that villian Dyn Mahomed Khan, who has the ear of the vuzeer, will be sent to supercede me." Futteh Mahomed Khan is a relation of vuzeer Yar Mahomed Khan, and is known to us as the envoy who was sent from Herat to Teheran. He is a thin, yellow complexioned, insignificant

Character of Futteh
Khan.

looking personage, with a very timid manner, indicative of his character, as it was the *boorj* he defended, upon which the Persian assault was made at the siege of Herat. He has since enjoyed, and makes the most of a

reputation for bravery; but it is said that on the day of the storm he was actually running away, when a young Furrahi seized him by the arm, and unconsciously making use of a famous expression, said, "The enemy are not there."

Futteh Khan is, however, a very pleasant companion; any timidity of manner soon wears off, and he has all the polish and address of a Persian. His kindness and polite attentions to myself, (not to mention the profuse hospitality, for which however the vuzeer of Herat, and not Futteh Khan, is to be thanked,) I must confess somewhat blinded me as to his real character, which I only discovered at Joroaine, when I was thrown among the exiled Furrahees. They perhaps exaggerated his demerits; but it would appear that on his assuming the government of Furrah, he persecuted the few inhabitants that still remained in the district, on the plea of their having joined the enemy, and thus contributed as much as the Candaharees themselves, to the desolation of the province.

26th.—We were hardly outside the walls of Furrah, when a letter was brought from Shah Pussund Khan to say, that on
 Letter from Futteh Khan. account of the danger of the road, he had sent out some twenty or thirty horse and foot to meet me at his frontier, and that he had prepared a room for me in his house. We were catching fish with *coculus indicus* in the river at Barunduk, where as the name implies, there is a water-fall, and a deep pool famous for its fish, when we were disturbed by a mounted party. This was the escort sent by Shah Pussund Khan, headed, by a person called the *Shaughoussee*, (because he had formerly served in that capacity to some prince at Turrah, Thenazis, and other respectable people.) The *Shaughoussee* apologized for the absence of the Khan's grandson and for the paucity of the horsemen; the young Khan and all the horse they could muster, having gone only a few days before to take possession of Killah Rab. As we approached Toojk, we could have counted its very inhabitants, for I suppose there was hardly a male who had not come out to see the first real *Feringee* who had ever visited them. Vi-kovitch they consider, what he called himself, a Cossack. We marched
 Toojk. into the town in a ludicrous sort of procession; numerous old women kept throwing water at me, as a symbol of welcome; and to keep off the evil eye, beggars burnt in-

cense under my horse's belly ; little boys with long sticks in their hands were continually crying, " Remember the poor scholars," *talib ul-ilm* ; and a testy *fakeer* walked just before me, and made my horse jump every minute by calling out, *ya huk*. The custom of throwing water I saw in no other place but in the Laush territories ; it resembles the presenting the "*rullus*" of Rajpootanna. They have another mode of welcome peculiar to Laush. When a new governor arrives, they tie a cow to a platform, which is carried on men's shoulders a few miles on the road ; while the chief is coming a man, stands on the platform with a knife in his hand, calling out " Shall I kill, shall I kill ? " If the governor says, " Kill," they prophecy he will be a tyrant. If he spares the animal, they escort him with great joy and acclamation to his house. The governor of Toojk, Khan Ishaukzye, named Jaun Mahomed Khan, met him before we reached the town ; we sat on a carpet under a tree while the tents were pitching ; all the house tops and branches of the trees around us being crowded with people eagerly gazing at us, and bursting into laughter every now and then, at the strange dress of myself and the sergeant. Jaun Mahomed, a singularly good-humoured-looking and talking person, began the conversation by saying, that he had been a rebel for twelve years, and he evidently prided himself no little upon it. But said he, " Yar Mahomed and I are now fast friends, and he has just sent me two horses."

He was very anxious to know, how we could govern Mussulmans. " For instance," he said, " suppose you had taken Candahar for yourselves, instead of Shah Shooja." After disclaiming the possibility of such an event as our taking Candahar for ourselves, I endeavoured to explain, that in India we governed Mussulmans according to their own laws, with some limitations ; and mentioned as an example the prohibition of

Blood feuds.

blood feuds, &c. " That may be all very good," he said, " but I should like to see any law that would prevent me killing a man who had killed one of mine." Hoping to get a little quiet, we retired to our tents ; but the curiosity of the people could not be repressed ; a large crowd squatted themselves around the doors, trying to peer through the chick to see what we were doing, and every now and then some beggar would poke his head in, and whine out, *Ai berae khoda !* " Ah for God's sake." Night only relieved us from this persecution ; I became rather alarmed after what Jaun Mahomed had

said regarding blood feuds, that Mahomed Siddie, who had not yet come in or sent his man, might, trusting to my protection join me here, and some unpleasant fray might ensue, in which my name would be mixed up. Sultan Khan reassured me, "that Mahomed Siddie was much too knowing to trust himself within the reach of his enemy; that the quarrel was nearly extinct, and propositions for settling it by a marriage had been sent in; and that as it had lasted 30 years, about an equal number of lives on each side had cooled it; they would be unwilling to renew the affair by fresh blood; but of course," he added "if they meet, they will attack each other." The two Douranee chiefs who had joined me at Jarja were halting for a few days at Toojk, having come on from Furrah a day or two before me. They were in great distress; two of their horses having been stolen, and one having died. I thought this

a good opportunity of doing a civil thing at a cheap
 Give away a horse. rate, I therefore sent them one of the horses which

Syud Mahomed Khan had given me. It was a worthless beast, not worth its feed; but I heard that the gift was much appreciated. We staid one night at Toojk, which has about one hundred and twenty houses. The inhabitants were of the same tribe (Tylishih) as their master,

Hyderzye Ishaukzyes. There were also a few of other
 Toojk. tribes, emigrants, and half a dozen chiefs, and altoget-

ther there was an air of comfort about the place remarkable after the general misery of the country we had been passing through. It has lately been made over to Shah Pussund. Jaun Mahomed Khan, who had been a most liberal host, insisted on riding out some miles with me. He was accompanied by his son, a young man of about 20, and some five or six other people, all his relations; and all well mounted on horses which Yar Mahomed had given the chief on his coming in. We took a parting pipe. I threw a *choga* over his shoulders, and we shook hands.

That we might get into Laush in good time the next morning, we stepped on the banks of the Furrah river, where there was water in small pools at Kurawan Keze, about eight miles from the fort. We reached our ground at midnight, and after cooking a rude dinner in the Afghan manner, on the ramrods of matchlocks, lay down to sleep. When I awoke in the morning, a man was sitting shivering by my bed. To my question, "Who are you?" he could only answer,

"They have killed him; they have killed him." "Killed whom?" I said, starting up in alarm. "Mahomed Siddie." As soon as we were able to re-assure the trembling wretch sufficiently to allow of his giving a connected account of what had occurred, we learned that Mahomed Siddie, who was desirous of coming on with me, had determined to rejoin us by making a detour to avoid Toojk; and striking into the road a few miles below, he had just reached the road, when he was met face to face by Jaun Mahomed's party returning home; He had but two more with him, his nephew and a servant, the man who had come to me. Jaun Mahomed's brother, the moment he saw his enemy jumped off his horse and fired his match-lock, but missed. Jaun Mahomed called out to let the other party alone; but just at this moment Mahomed Siddie's nephew fired, on which Jaun Mahomed's son galloping up, killed him before he could remount, with one blow of his sword. The other two fled, and Jaun Mahomed and the rest coming up, all dug their swords into the dead body. The last circumstance we learnt afterwards; and such is always the custom in similar cases. Somewhat relieved at finding that Mahomed Siddie was not himself killed, (the servant's fright alone having caused him to mention his name,) we now consulted how to secure his servant's safety; for he was clinging to me for protection, and declaring that he should be murdered by the Ishaukzyes. The Shaughoussee swore that no harm should happen to him while he remained with me, and then the man consented to accompany us as far as Laush, when he would get a present and *khillut* for his master. As we were riding along; I asked the Shaughoussee, "Is the feud now quenched; do you want any more lives?" He answered by holding out two fingers. Some sixteen lives have been lost in this quarrel.

We were met at about 200 yards from the fort gate by the Khan, himself mounted, and his attendants on foot, for all the horsemen were either with me or at Killah Rab; we dismounted and joined hands, and as every one with me had to place his hands between those of the Khan, I thought we should never have mounted again. The room selected for me was nearly at the top of the castle, and the same in which Vikovitch had lived. It was small, not very clean, and but poorly furnished; but to compensate these disadvantages, it commanded a view of the plain below, of which we were never tired. The fort

of Jorroaine is about two miles from the rich valley, dotted with villages, and the river running close under the walls. From the exaggerated accounts of the Heratees, who always speak of Laush as an impregnable place, I had expected to find it at least a strong fort. It is in fact nothing but a castle, and could soon be reduced by shells, or even stormed, for it has one weak side.

The appearance of the fort could only be understood by a drawing, and unfortunately my views of this and of some
Laush. other places have been, by mistake, left at Candahar. It will be sufficient to mention here, that as the name "Laush" implies, the fort is built on the edge of a high "cliff," immediately under which flows the Furrah river; on the East face it has the perpendicular cliff, over which are erected buildings to a height of perhaps 400 feet; a great part of these will, I suspect, fall down the precipice in another year, for the water in the spring cuts below, weakening of course the upper bank, and already several ominous cracks may be observed. I pointed this out to the Khan, and recommended his turning the stream by a bank from immediate contact with the base of his castle; but he will doubtless forget the advice he promised to follow, till half his family are overwhelmed by the fall of his house. The N. and W. faces are detached from the high plain beyond them by a deep ravine; but the S. side offers but little obstruction to a regular army. Laush is an ancient place, though I do not remember its name mentioned in history. The cliff on which it stands has many caves cut in it, and there are said to be subterranean passages, to which perhaps the women of the garrison could retire in case of its being attempted to shell the fort; but most of these passages have neither fallen in, nor have been stopped up. In case it should be necessary to take the place, a mine led under only a small part of the E. cliff, would I suspect on exploding, bring down half the castle. Laush and its territories belonged to the Vuzeer Shah Wallee; it was destroyed by Timoor Shah, and remained desolate till taken possession of and rebuilt by Shah Pussund Khan, on whom it was bestowed by Mahmood, when he returned from Teheran. The life of Shah Pussund Khan would occupy a volume. A sketch of it will not be in appropriate here, as his actions and character have frequently been misrepresented. There are three principal families among the Ishaukzyes,

which will be best understood by a diagram. This diagram will also serve, to explain much of the ensuing narrative :—

Ishaukzyes have four principal divisions.

HAWAZYES.

TEROZYES.

MUNDURZYES.

IDZYES.

*Shudoonzyes.**Zadinzyes.**Ahmedzyes.*

Shah Pussund Khan;
Ahmed Shah's General,
his family in poverty
at Candahar.

Muddut Khan; Meer Af-
zul Khan; Dila Sar Hadgi;
Dost Mahomed Khan; Wull
Mahomed, present head.

Kohun Dil Khan;
Selah Mahomed Khan,
(vulgarly called Sauloo)
side of Shah Pussund
derived from Shah Ma-
homed Goolzar Khan,
governor of Feraria, at
Candahar.

Russool Khan, with
King of Persia; Ah-
med Khan, governor
of Killah Rab; his
mother, a daughter
of Shah Pussund Kn.
brother of Khan Je-
han Khan of Seistan.

Abdool Hu-
beeb, blind at
Laush.

Abdool Ma-
jeet, service
of Shah
Shooja at
Candahar.

Mahomed Siddiek
Khan, a child; Maho-
med Hussein, a child; a
mother; a daughter of
Khan Jehan Khan.

Ahmed Shah, when after the fashion of the Ghilzees he portioned out the offices of his household among the Douranees, and made them hereditary in particular families, assigned four appointments to the Ishaukzyes: Mir Aspaha, master of the horse; Purawal, leader of the van; Darogha of camels; and Mir Shikar, chief huntsman. The grandfather of Shah Pussund Khan, (Rumal Khan,) was Mir Aspaha of Timoor Shah, as was Ruheem Dil Khan of Shah Mahomed. Saleh Khan followed Mahmood in his wanderings in Tartary; but alarmed at the murder of his clansman, Meer Alum, went over to Shah Shooja, as related in Conolly's Travels, vol. ii. p. 362.

Mahmood understanding, doubtless, the true motive for his desertion, wrote him a letter to the following effect:—"I have made you; if you will not remain with me, do not at least join my enemies." Saleh Khan on receipt of this, determined to stand neuter, and went off to his fort at Laush.

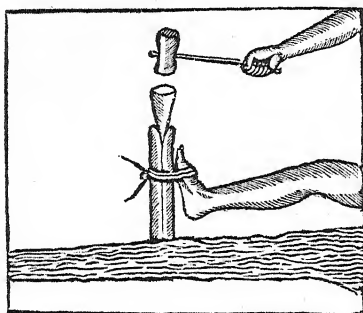
Hadgi Feroze wishing to get Jorraine and its dependencies for himself, sent Dost Mahomed Khan Populzye with an army to take it, and Shah Pussund, who had no stores laid in to enable him to stand a siege gave up Jorraine, on consideration of being allowed to keep Laush. Dost Mahomed soon after, desirous of returning to Herat, insisted on Saleh Khan's leaving the neighbourhood, and that Khan, who had no power to refuse, went off to Kamraun, who was now governor of Candahar. The prince received him kindly, and kept him six months; afterwards quarrelling with his manager, (Gool Mahomed Khan Populzye,) he gave Shah Pussund his place. In this situation he continued for nine or ten years, and Laush and Jorraine had again come into his possession, the garrison having ejected the governor left at the latter by Dost Mahomed, and given the place to the Ishaukzyes.

At the seizure of Shah Pussund Khan at Herat (Conolly, vol. ii. p. 408) he led a most eventful life, till the death of Mustapha Khan (Ibid, 413;) during that period he wandered from place to place perpetually and with much success plotting against Kamraun; making friends at different times with the rulers of Khaff, Toorbuk, Meshed, &c. He even visited Teheran, and was well received by the king of Persia. He more than once gained and lost Jorraine, Turrah, Anardurch, and Killah Rab; but he failed to get possession of Laush.

He was now Kamraun's minister at Herat; the prince gave him Furrah and Jorraine; but still with jealous care guarded Laush for himself only. At the request, often repeated, of Saleh Khan, he consented to sign a paper, purporting that that fort was the Khan's, who pretended that his reason for demanding such a document, was to save his honour in the eyes of his tribe.

A year had elapsed, Kamraun had forgotten the paper, when all of a sudden a messenger of Shah Pussund's arrived at Laush with a letter to the governor from the Khan, enclosing the document sealed and attested by the Shahzadah, and requesting the delivery of the fort, according to the tenor of the enclosure to a person of his appointing. The

governor was completely taken in; the fort was given up, and Shah Pussund immediately fled to it; turned *yaghee*, (rebel,) and has since successfully resisted every effort to reduce him seven or eight times; and twice in person Kamraun has blockaded Jorraine and Laush. These repeated attacks have impoverished the rich valley; but a few years of quiet under Shah Pussund's rule, which is very popular, will render the district more fertile and populous than it has been since the days of Nowsherwan. The lord of Hak, (for such is the proper name of the district,) is now about sixty years old; in his person he retains none of that beauty for which he was remarkable in his younger days, and to which, if we may believe scandal, he was indebted for the title to the



king's favourite. He is very lame, which was originally occasioned by a bullet wound in the thigh in the battle of Khoo-skhi-i-Nukhood, near Candahar; but principally from his having been subjected to the torture of the *thanah* when he was seized at Herat. In this torture, the victim's foot is fastened to a

thick wooden pin (driven into the ground) by cords drawn as tight as possible over the ankle, a wedge is then hammered into the pin, causing by the tightening of the string extreme suffering. It is said that the ankle is broken, and that blood, (but this seems false) starts out at the toes.

The address of Shah Pussund is by no means prepossessing, and there is a considerable awkwardness and formality in his manner, which however wears off, particularly if he has become excited in argument, when he speaks with great earnestness, using much gesticulation. Though he has been so much among Persians, and speaks Persian fluently, he appeared alway to avoid talking, if possible, anything but Pushtoo. This seems a trifle; but it is one of those trifles which has contributed not a little to his popularity among his countrymen. Another now palpable cause of this popularity is, the simplicity and plainness, which is the principal feature in his character. He despises show.

When minister at Candahar, though lame from his wound, he would never get into a *tukhtrewan*, because he said, he was no better than any other Douranee. His dress is always plain; sometimes coarse; he has never since reaching to manhood dined but in public, and the poorest persons share his dinner, which is usually composed of only mutton broth and bread, but plenty of it. My Meerzas felt much flattered the first night of our arrival by an invitation to dine with the Khan; but on seeing the fare spread for them, they could not taste it, and always afterwards avoided as much as possible the honour.

This simplicity of life, as I have before observed; these unaffected manners; but above all his hospitality, have gained Shah Pussund Khan, the heart of the Douranees. A Douranee in my presence asked another what made Futteh Khan, the vuzeer, so popular? "He was a robber, a liar, a tyrant, and addicted to abominable vices." "One thing more," replied the other, "his bread, his hospitality."

The hospitality of Shah Pussund is the theme of praise in all the countries bordering on Herat, and what renders it the more remarkable is, that he is not esteemed rich; nor can he be so, as Kamraun extorted a good deal of money from him and his country; for the constant warfare it has been exposed to, can have yielded but little. During my stay in his house—which circumstances protracted to fifteen days—I could not, though I more than once urged him, with all the arguments in my power, induce him to abandon the expensive kindness of feeding the whole of my establishment. His very mode of bestowing his bounty enhances the value of it. There is no waste, no profusion, every thing is appropriate, and ample. To me a dinner was always served up from the *anduroon*, and every day different sweetmeats were sent in with the compliments of his son. The Hindus had their grain, ghee, &c. the Mussulmans sheep,—so much apportioned to each man; even the straw for the horses, for it was a scarce article, and was served out by weight. Besides my party, there were several others, who were all entertained in the same style. There were the servants of Alladad Khan, who accompanied Vikovitch to Teheran and died there, who were conducting the *taboat* to Candahar. They had been robbed in Seistan, and had fled to Laush for assistance and redress. There was the family of Jooma Khan, brother of the

Candahar sirdar, who had been robbed while returning from Beerjund; and whose family Shah Pussund sheltered, having sent out a party to bring them in as a friend. The son of Ahmed Khan had also arrived, and an *elchee* from Meshed, and several others of less consequence, not to speak of some lady guests, who were dependent, was evidently an every day matter. It did not create the least bustle or confusion. My host used always to visit me morning and evening, sitting for about an hour, always in one position, (which like Baber's uncles* he never changes,) that called the *dayanu*. He was generally accompanied by a crowd and by a pet child, whose mother—a daughter of Khan Jehan Khan—had died a few days before I arrived. He had been much attached to her, and frequently spoke to me of his loss. I took an early opportunity of offering him, on the part of the envoy and minister, a diamond ring, and a shawl, and of presenting my credentials and letters from Major Todd. Shah Kamraun's introduction I thought might as well be in my desk, nor did I through my journey find it politic to present any of those I had received from him or from Yar Mahomed Khan. Saleh Khan at once acceded to my request of procuring grain for Major Todd, and in a few days the camels were brought from Furrah; and with some more hired ones were sent to Herat, loaded with wheat and barley, which was however procured with much difficulty, and had to be scraped together by seers at a time. In a (acknowledged) letter to Major Todd, I have detailed all the conversations I held with the Khan on political matters, and the earnestness with which he expressed his good will-towards the Shah of Cabul, and the English government, and explained the necessity which had forced him to have recourse to the alliance of Persia. I need here, therefore, say no more on this subject, and will again continue my interrupted Journal.

August 30th.—The Khan this morning brought in a small bag, and told me he had a favour to ask of me. He had been over-looking the property left by his wife above mentioned, that he might lock up any

Snake stone. thing of value for the after-use of her son, and had discovered, he said, a bag of precious stones. “She

got them, poor thing, probably after some *chuppao*: what the greater

* See Baber's Memoirs, p. 20.

number are I do not know ;” added he, “but one of them is I am convinced a *puzur*, preserver from stings, or snake-stone ; now just tell me what they are all worth ?” The bag on being opened, was found to contain nothing but a parcel of agates, cut into different shapes, and what evidently once formed the stock of some itinerant seal-cutter.

He had been so long opening the strings of the bag, that my curiosity had been warmed, and on perceiving the contents, I perhaps rather too bluntly exclaimed, that they were not worth a rupee. Saleh Khan seemed much disappointed, and only half-convinced ; he carefully put the stones into the bag again one by one, only reserving one red one, the *puzur* ; “And this ?” said, he, holding it out (“for God’s sake” whispered Mahomed Tuher, “say it is something curious ;”) but I thought it wisest to speak truth, and told him, that snake-stones were now found to be mere fallacies. He replied, “That is all nonsense ; that the *puzur* cures snake bites is a well attested fact. It was found in the belly of a deer, and why should it be there if it was of no use ? Besides you can easily see if this is a *puzur* or not, for if it is the real stone it will sweat on being put into the sun.” A plate was actually sent for, and the agate placed in it, and exposed to the sun, and the Khan, though soon doubtful of this identical stone being the *puzur*, believes as firmly as ever in the real one. He now put into my hands a small box, which I found contained the watch which had been sent to him by Mr. Macnaghten three months before. “I would not open this,” he said, “though they were very curious up there” (pointing to the *Zenana*, which is on the highest part of the castle,) “to see what was in it, for fear of spoiling it, and as I knew you were coming”. He was much pleased when he had learned to open and wind it up ; the last of which he would, all I could say, do every half hour, and then send the watch to me, saying it would not wind. The ignorance displayed on this occasion by Shah Pussund Khan at first surprized me. I had expected from his intercourse with Persians, that he would have been better informed on European matters than his countrymen ; but the little of our science he has picked up in his travels, half-learnt and half-understood, has only served to confuse, and not to improve.

He thought (and it is a popular belief in Khorassan,) that all the Russian gold money was found ready coined every Christmas-day at the bottom of a well, which is previously filled with baser metal. Some-

body having tried to make him understand the extraction of sugar from beet root, he has impressed his whole neighbourhood with the notion, that Russian sugar, which they always see in loaves, grows in its primeval shape like a carrot. One of my most acceptable visitors was the blind son of my host. He is not yet thirty, and has been blind some 12 or 13 years; one eye has been entirely destroyed by the lancet of some Candahar practitioners; from the other he can see a little, and it might I think be cured by couching. I wish indeed to bring him with me to Caubul, that some of our oculists might look at his eyes; but having thought of trying to cross the Ghore mountains, I feared his helplessness in such a region, and only pressed him therefore to go at once to Herat and take the advice of the doctors there. Like the most educated blind persons, he has a mild placid address, and a very retentive memory, and it was from him that I learnt the greater part of his father's history. He asked me to dinner, and the Khan, for once in his life, consented to be of the party. The host on this occasion would not sit down with us, but stood at the door, superintending the relays of dishes till we had all finished.

I mentioned to Shah Pussund my desire of paying my respects to the governor of Jorrajine; he evidently was unwilling that I should go there, but did not well know how to put me off. He sent one or two persons privately to persuade me that the visit would look odd; that Goolzar Khan was a mere cypher, and of course there was a ready answer to such arguments. I have a letter to present, and must go. He was, I believe, fearful lest old Goolzar Khan, who is not on very good terms with his nephew, and who had all the garrulity of age, might speak to his disadvantage, or perhaps let out things he might not wish me to know. At last, however, I set out. I was met as usual by a large crowd, and by an *istikbal* of three or four of the old man's sons,

and Goolzar Khan himself came down from the fort

Jorrajine.

on foot to receive me, though he cannot walk without difficulty. He evidently was delighted to see me his guest; he began to fear that I should pass him by, and his honour was concerned in the matter. Somebody had also told him, that I would not make myself understood in Persian; but when he found that I enjoyed his stories of the old times, he told them with all the pleasure one receives from finding a new auditor to an old tale. He is a fine old gentle-

man, of about eighty, and his whole life has been a series of adventures. He was very funny and amusing: "There, bring the *Sahib* a kullion. I suppose you smoke well. In my younger days not one of us smoked, but those — Persians have infected us; very well, and how is my friend the vuzeer? May his house be blasted! Look at my feet, this is his doing." He held up his feet, of which all the toes had grown as it were into one. A very few years ago, Yar Mahomed Khan wrote to him addressing him as his father, as the whole hope of the Douranees, and sending him a Koran in pledge of his sincerity, and pressed him to come to Herat, where he should be treated with every distinction. The old Khan trusted him and went; he was seized and brought before Jorraine, where they beat the soles of his feet to a jelly with sticks, to make him write to his son to give up the fort.

I spent a very agreeable day, and returned in the afternoon to Laush. Jorraine is still a virgin fort, and could always, if well defended, keep out any Asiatic force. The walls, which may be about 200 yards in length, are very thick and high. The balls of the Heratees made hardly any impression on them. It has but one gateway, which is on the north face, and would be difficult to be forced. The base of the fort is elevated above the surrounding plain. Its weakest point is, that it is surrounded on all sides by buildings, so that it can be securely approached. The few measurements we were able to get by stealth, are mentioned in the Military Memoir. There is a dry ditch, but it is now half filled up. It was, when we were there, the most populous place I had seen since Candahar. All the Furrahees were settled round the walls in huts or black tents; their flocks were feeding in the plain; their cows had been sent off to the Humoon. There was hardly a yard of ground within the fort not covered with buildings. I do not exactly understand the relative situation of the governor of this fort and of Shah Pussund Khan. The latter is the real head; but he seems to interfere little with the affairs of the fort, and when Goolzar Khan dies, it is an understood thing that his son is to succeed to the lands immediately belonging to the fort, which yields only some 80 *khurwars*. Shah Pussund has three parts and Goolzar two.

Memoir on the Coal found at Kotah, &c. with a Note on the Anthracite of Duntimnapilly, (H. H. the Nizam's Dominions.)—By W. WALKER, Esq. 24th April, 1841.

NOTE.—In submitting the accompanying Memoir, I have purposely abstained from giving any opinion either as to the quality of the Coal, the practicability of mining, or the likelihood of a large supply of the mineral being procurable at Kotah.

Destitute at this remote place of all means of forming any estimate on a subject on which I must in a certain degree be one-sided and prejudiced, I leave to others the decision of the intrinsic worth of the article, and both the other points. I refer to the practical engineer and miner, who alone, after survey, &c. are capable of forming a correct judgment.

Yet, I may be permitted to give it as my opinion, that the river merely touches the edge of the Coal basin, and to this I am led by the fact of no carboniferous limestone appearing on the other side, or on any of the shallows to the right: the dip too of the stratum to the N. E. would appear to be favorable to boring on the left bank. The alluvion there, as noticed in the Memoir, is about forty-five feet deep, and is a loose soil containing few pebbles. I may also observe as favorable to mining operations, that the general complaint of the inhabitants along the river is the great depth they are obliged to go before water is reached; this is particularly the case in the fort of Seronge, five miles below Kotah. On account of this difficulty of obtaining well water, the inhabitants are compelled to use that of the river, much against their inclination; as at certain seasons it is deemed by them very unwholesome.

At Madhapore, there were brought to me some minerals from the bed of the Godavery at that place, which it required little discrimination to decide were of the nature of slate coal. Upon inquiry I found, that after the monsoon at the Dassara festival, persons employed themselves in gathering these minerals to be vended as medicines; and more particularly as charms to keep off the all-dreaded Evil eye, for which purpose they were burnt, incantations being said over them while inflamed. Their Tellugoo name is *assoorpoory*, and it is believed by some of the natives, that they were the weapons with which the

gods contended ; while other maintained the opinions, that they annually grew and were thrown off the river's bed, or sprung like the Cytherean goddess from the water foam ; but all agreed that it was the Pundeetah river that supplied them. I lost no time in proceeding to the Sungum of the rivers Godavery and Pundeetah, and upon receiving, what I conceived from specimens shewn me, correct intelligence of their origin, I ascended the river to a place called Kotah, a small Goand village on its banks, about ten miles from the Sungum, and twenty miles N. E. of Chinnore ; a space of about eighty yards in length, and thirty in breadth was pointed out at the edge of the left bank of the river, the alluvial covering of which could not be much under forty-five feet, and this I was told was the original seat of the coal. Upon examination, I found that limestone, more or less argillaceous, occupied this space ; the upper strata were completely dislocated, and deranged by the force of the current ; the inferior, however, appeared more compact and hard, and as far as could be ascertained, dipped to the N. E. at a low angle. Seeing that the water must have completely denuded these limestones of any shale or coal that may ever have accompanied them, I thought of searching a little higher up in the bed of the river, and observing a small rock of the same argillaceous limestone just above the water, search was made there, when coal along with its accompanying shale and bituminous shale was broken off from the sides of the rock : this left no doubt as to the existence and position of a coal measure. The rock formation in which it is to be supposed this coal measure exists, is that where the mineral is usually found all over the world, and in India without any exception. According to the report of the Calcutta Coal Committee, the depth of the alluvium, and the circumstance of the outcrop being in the river's bed, precluded all possibility of ascertaining the relative position of the several strata ; but as sandstone is found on all sides, and towards the north at the short distance of two or three hundred yards, it is more than probable that here there is no deviation from the arrangement of rock commonly found to exist in such cases. As to the sandstone itself, I cannot give a better description than in the words of the late Dr. Voysey, who travelled over a great part of this country, and must have been perfectly familiar with the sandstone formation of the Godavery :—

"The sandstone varies considerably in composition and colour. Its variations however, occur principally in the neighbourhood of its junction with the other rocks. Its most common cement is lithomarge, which is also found in it in nests and beds of various sizes, and of colour both white and reddish white;" and he might have added, yellow.

But I am aware any description I can give of the locality and of the accompanying strata, will be deemed deficient by the geologist, without specimens illustrative of both. I therefore proceed to give a brief description of those sent.

Box No. 1.—Contains specimens of shale, more or less bituminous, which were broken off the rock along with the coal.

Box No. 2.—Contains specimens of shale found in the same situation.

Box No. 3.—Contains specimens of the argillaceous limestone, composing the dislocated and disturbed strata formerly described. Some of these blocks are from a foot to a foot and a half in thickness, with a surface twenty to thirty square feet.

Box No. 4.—Contains specimens broken off from the compact and hard limestone, that has resisted displacement by the current. One of these will be observed to be water-worn.

Box No. 5.—Contains specimens of sandstone in the vicinity of the coal measure.

Box No. 6.—Contains specimens from a neighbouring hill.

The river at Kotah is one hundred and fifty yards wide, is proportionably deep, and is always turbid. It contains, at this season at least, more water than the Godavery. The country around is jungly; Kotah itself is the first Goand village on that side of the Chinnore Sircar, and is a miserable little place. I sent a party several miles up the river to discover, if possible, any sign of another coal deposit; but they returned without a mineral of any description. About eight miles up the river, among the hills at the village of Yenkatapore, there is found brown clay iron ore among the sandstone. I did not hear of this until I had reached Chinnore, and an opportunity was thus denied me of visiting the locality. I send specimens procured from the place in box No. 7. This ore was formerly smelted; but the works have been abandoned; the natives give a good character of the iron produced. The specific gravity is above 3.

Note on the Anthracite that formed the subject of my Letter of the 28th ultimo.

An intelligent Mootsuddy, with a couple of peons, were despatched to the Jungaum purgannah, where the village of Duntimnapilly is situated, the nearest to the spot where the anthracite was said to be procured. On arriving at Chinnore, he proceeded in a north-westerly direction by Tandoor and Jungaum to Duntimnapilly, which is distant twenty miles from the last mentioned town.* The country between Jungaum and Duntimnapilly is described as particularly wild, with Goonds for inhabitants. According to his account, the bed of anthracite is situated on the bank of a nullah among hills, (I regret that not having a large map I can indicate the situation no better,) that it is three feet at its greatest breadth, and that it extends upwards of two hundred feet in length. I give these numbers with some confidence in their being accurate, as he brought a piece of bamboo with him by which the stratum was measured.

Box No. 8.—Contains a carbonaceous sandstone, through which the anthracite was said to pass into the micaceous sandstone, both above and below. A specimen of the latter is in *Box No. 9.*—I send also further specimens of the coal itself. The rock above the mineral was said to be fifteen feet in thickness. It may be added, that this coal is esteemed of great value in the United States, where seven hundred and fifty thousand bushels were sent to Philadelphia alone in one year, (Ure's Dictionary.) It is there burned in peculiar grates adapted to its difficult combustion. It is used also in South Wales for smelting iron.

CHINNORE, *24th April, 1841.*

* Jungaum is 65 miles to the West of Chinnore.

Note—I have used the general term sandstone, although there can be no doubt from its position, known connexion, extent, &c. that it is the old red sandstone; for the same reason, to avoid all theoretical views, I have designated limestone by its mineralogical character. It would have been easy to have given more learned terms, but my chief object—perspicuity—might have been compromised by having done so.

Extract from Proceedings of the Numismatic Society of London, 1837-1838, on the comparative status of circulating media at different periods, under the Bactrian and Indo-Scythian Kings.

The number of coins in the different metals, quoted for each reign by Mionnet, are affixed in the corrected series, together with that of those given by Professor Wilson from the Masson Collection, in the three annexed plates. Of the former, the total number is 166, and of the latter, 35; which, aided by Professor Wilson's remarks, are enough for general conclusions regarding the circulating media of the several periods, and thus far elucidating the statistics of this portion of history.

It will be evident that, under the Greek line in Bactria and India, silver and copper formed the commercial medium by which the treasury was replenished. A single gold coin, and another of potin, are the only exceptions to this remark in a series of 105.

Then follow ninety-six coins of the barbarous successors of the Greeks; displaying a remarkable decrease of silver, and nearly as notable an increase of gold. The whole are distributed in the following proportions:

	Gold	Silver	Copper	Potin
Græco-Bactrian kings, to Eucratidas I. inclusively. B. c. 255—125. Monoling.	1	26	5	...
Græco-Indian kings, from Eucratidas II. to Hermæus. B. c. 125—0. Bilingual.	...	14	34	1
	1	40	39	1
Græco-Indian kings of the collateral line, from Heliocles to Mayes. B. c. 125—A. D. 100. Bilingual .....	...	9	15	...
	1	49	54	1
Indo-Scythian kings, who followed the line of Eucratidas II. A. D. 0—125. Bi.	7	...	35	...
Barbarous princes, who appear to have followed the collateral Greek line. A. D. 100—225. Mostly Bilingual .....	...	...	5	...
Indo-Parthian kings, who probably followed the Indo-Scythians, and gave place to the Sassanians. A. D. 125—225. Bi.	...	6	41	2
Gold	8	55	135	3
Silver	55			
Copper ...	135			
Potin	3			
	201			

By this statement it would appear, that the proportion of silver (the standard medium of Asiatic commerce in the age of Bactrian independence, as at present) materially diminished under the Græco-Indians, until a substitution of potin, probably to make up the deficiency of the former, appears in the coinage of Hermæus, the last of the Greek Soters; while the silver bears scarcely any proportion to the copper under the Indo-Scythians and Indo-Parthians, and, at first, altogether disappears; whereas, the potin (which was used in great extent in the contemporary coinage of Parthia), is continued: and this may account for the silver drachms of Menander and Apollodotus being then in circulation.

The deficiency of silver seems, however, to have been compensated by an extensive issue of gold, under the first Indo-Scythic princes; of which there are, likewise, many fine unpublished examples in the collection of the East India Company.

The conclusion seems forced on us, that the progressive decrease of silver under the Greek rulers, indicates a decrease in commercial prosperity, arising from the Scythian occupation, first of Bactria, and afterwards of Bactrian-India; while this appears to be contradicted by the gold issue of the conquerors.

But, as the latter have left no known remains of a coinage anterior to their occupation of Bactrian-India, we may infer, first, that the mintage of the line of Euthydemus continued in circulation under the Bactro-Scythians, as did that of the line of Menander under the Indo-Scythians; and, secondly, that plunder (of the temples? in connexion with the introduction of the Parthian worship, as above), rather than commerce, was the source of the sudden riches evinced by the mintage of the latter.

This view will, besides, afford an additional and weighty reason for referring the issuers of the gold coinage—the probable invaders and plunderers of the Greek provinces—to the head of the dynasty, as the immediate successors of the line of Menander; to which position they are equally referred by their imitations of the mintage of Hermæus, found with the coins of that prince, and by the usurped title of Σωτηρ.

In agreement with the above, the Indo-Scythic issue would appear greatly to have degenerated under the latter princes of the dynasty, when their exhausted dominions probably no longer afforded materials for an issue in the precious metals.

The poor mintage of the Indo-Parthians might have either been a continuation of the latter, or of that of the later Greek princes. It presents no sudden alteration of currency, like that just alluded to; and, in either case, has the character of a peaceful revolution, or change of dynasty. But as we cannot doubt that the paramount Greek domination in India, as well as in Bactria, was annihilated by conquest, it seems to follow that the change in question has no connexion with that revolution, but was a natural one, from a Scythian to a Parthian dynasty, as inferred in a former note. Such, at least is the conclusion forced on us by the present data, which, we may hope that the continued researches of Professor Wilson, with whose invitation to inquiry the present analysis is an imperfect attempt at compliance, will either confirm or correct. That there were Parthian as well as Scythian rulers in India in the Roman age, is evident from the names preserved by contemporary writers (see Table I.) They are not those of the Indo-Parthians of the coins, and may have preceded them.



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*Report on the Island of Chedooba.—BY EDWARD P. HALSTEAD, ESQ.
Commander of her Majesty's Sloop 'Childers.'*

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[For much of the information under the head of History, Police, Revenue, Manners and Customs, I have been indebted to the kindness, and long residence in the country of Captain D. Williams, Senior Assistant Commissioner at Ramree.]

DIVISION I.

General Appearance, History and Division.

The Island of Chedooba measures $15\frac{1}{2}$ miles in length, viz. from $18^{\circ} 40'$ to $18^{\circ} 55' 30''$ N. Latitude, and 17 miles in width, viz. from $93^{\circ} 30'$ to $93^{\circ} 47'$ E. Longitude, and shews on the map as a square the S. W. angle of which has been reduced. With its dependency of Flat Island on the South Coast, it covers an area of about 200 square miles. Its general appearance and character is that of a fertile well wooded Island of moderate height, and irregular outline. A band of level plain, but little raised above the sea, extends around its coasts, of far greater width on the East than on the West ; within this lies, irregular, low, undulating

hills, varying in height from 50 to 500 feet, enclosing several higher detached mounds of steep well wooded sides, the loftiest of which, near the south part of the Island, rises nearly 1,400 feet.

The view from the top of these higher summits, presents, immediately below a scattered irregular mass of hills, confined principally to the western part of the Island, covered with jungle, interspersed with grass plains of more or less extent. To the Eastward a broad flat plain intersected with patches of jungle; and surrounding all, lie the cultivated rice fields with the different villages on their verge nearest the sea, the coast of which to the Westward is every where strewed with broken and detached masses of rock jutting far out.

The History of this Island is involved in all the obscurity which at present surrounds that of the neighbouring Continent. Under the name of Inaon it constituted in the time of the Mug Rajahs, one of four divisions of a province known collectively with the other three, Arracan, Ramree, and Sandoway by the name of 'Preegree.'

The head authority in each division was then called 'Jah,' and was nominated every three years, to prevent any attempt at independence of the supreme power by the Rajah of the Province, a matter not difficult in time of oppression, confusion, and general disorder.

On the conquest of the Province by the Burmese in 1784. its divisions were still retained, but their names, as well as that of the collective Province were all changed. The latter took the name of 'Lemroo,' instead of 'Preegree,' while the name of Chedooba itself was changed from Juaon to 'Mekawuddee,' and its revenue assigned to the support of the King's eldest sister, condemned to perpetual celibacy, as being unable to obtain a helpmate for her.

The alteration in the names of the Province and its divisions was accompanied by a change in those of the authorities. The provincial Governor was called 'Lemroowrain' or Governor of four countries, a title still given to our Commissioner, while 'Juorooan' took the place of 'Jah,' as designating the head of each division, and is now applied by the inhabitants to the assistant commissioners.

The division of the Districts into Pergunnahs was also left undisturbed by the Burmese, and the head man of each, under the Mug Raj continued to be called 'Soogree.'

Of these Pergunnahs or circles with their Soogerees, Chedooba is divided into seven, viz: Kamman, Krae-rone, Inrooma, Inenbrenge, Kyonktan, Tang-roa, and Ree-yueng, the latter its dependency of Flat Island, on its southern coast.

Of these circles, Kammaa and Tang-roa, which divide the whole western, southern, and part of the northern portions of the Islands, are the most extensive, but least populous, Kyouktan the smallest in extent. The other three the most productive and populous, and Ree-kyueng the best cultivated.

DIVISION II.

Population—Revenue—Police.

The population of Chedooba may perhaps, comparatively with the neighbouring countries, be looked on as large, by the census of 1839-40 amounting to 8,534, and when it is considered that this population is confined to the strip of cultivated land surrounding the Island, at least that portion of the Island will be esteemed to have a fair share of inhabitants. No great increase from census to census is at present observed, but as I was informed that formerly the Island possessed a far denser population, evidence of which was afforded in the amount of land now waste, which had formerly been cultivated. I have no doubt that the effect of its present state of comfort and peace must soon develope itself in a large increase of inhabitants, who I was informed by one party were so numerous before the Burmese invasion that famine was sometimes the consequence of the inability of the Islands to support them, a statement I think not to be entirely depended on. As there is but little influx or efflux of strangers, the census from year to year, if correctly taken, presents the changes occurring among the actual Islanders. But from what I saw, and from a portion of the revenue being derived from a poll tax, I incline to think it is greater than the returns shew.

With exception of a very small community of Burmahs lately established on one of the eastern villages the whole population is Mug. Their account of themselves is that they are descendants of parties who originally used to cross to the Island from the mainland and Ramree to cut wood, and who eventually and slowly settled on it.

For sometime subsequent to the English possession of the country, considerable complication prevailed in the district, and partially in Chedooba owing to the mutual ignorance of the governors and governed.

The mistaken Revenue system introduced in 1827 and 1828, have been replaced by an equitable and judicious taxation: its present result is content, happiness, and peace, its future in all probability an increase in all these, in addition to opulence and prosperity. The revenue is raised from

the produce of the land, and from a light poll tax. There are no difficulties found in its collection, nor oppression resorted to; about 25 per cent. is absorbed by the payment of the collectors, the ordinary native authorities. The Soogree of each circle receives 20 per cent. on his collection, the Ruagon or head villager, 4 per cent., and the Rua-charee or Village clerk, assistant to the Ruagon, 1 per cent. These are also exempted from all taxes.

Besides the above, there are two or more officers in each village called Leedo-gongs, or heads of men, whose negative payment consists in exemption from taxation.

There is a native Police taken from among the people. Their duty consists in maintaining peace and quiet among the villagers, for which purpose some shady tree or bamboo clump is selected in the centre of each village, supplied with a bench and sort of small hut, where day and night, the Leedo-gong sleeps his watch. In fact in Chedooba his office is a sinecure, theft or plunder are not known, the men are too good humoured to quarrel, and I was told that the only call ever made on him, was one only occasionally to settle the few little amiable differences sometimes occurring among the ladies of his jurisdiction.

At the Town of Chedooba there is a small Sepoy Police, their business is to keep up communication with Ramree the provincial capital, and act as letter-men in the conveyance of orders, from the assistant commissioner there, to the different Soogrees.

I subjoin the official Statistics of Chedooba, for 1839-40 or Mugaera 1202.—

Names of Circles.	No. of villages in each.	POPULATION.				Amount of Rev of 1839-40.	No. of Buffaloes in 1838-39.	No. of Cattle in 1838-39.	No. of doons of land under Cultivation.
		Men.	Women.	Boys.	Girls.				
Maoun,	5	541	469	446	404	Rs. 3,243	520	545	Doons. 160
Moubreng,	7	531	461	417	377	4,033	675	208	226
Kreroo,	4	361	315	245	245	1,892	547	187	84
Kyoukiam,	4	295	276	278	222	2,102	407	121	104
Requin,	2	124	120	106	110	1,219	659	..	75
Joungroa,	3	418	353	317	285	2,347	794	13	115
Kama,	3	240	209	190	179	1,429	287	59	76
Total,		2,510	2,203	1,999	1,822	16,269	3,889	1,133	844
Total of Souls,		8,535							

DIVISION III.

Soil and Productions, cultivated and natural,—Waste Lands.

Soil and Produce of Cultivated Lands.—The general character of the soil of Chedoooba, is that of a light greyish coloured clay, mixed more or less with vegetable mould and on the low eastern parts of the Island, this admixture again modified with a large proportion of fine sand.

The cultivated lands do not generally extend quite to the present beach of the Island; between them and it there exists, throughout its circumference a slip of land varying from 3 or 4 miles on the eastern parts of the Island, to sometimes less than a furlong on the western, which about 90 years since was upraised from the sea during our earthquakes.

This new land is not yet in general cultivation. On the east-north, and north-west it is so in part; on the west it is so thickly strewn over with stones as to make it probable it never will be. Throughout the circumference of the Island, the old beach line which is distinctly traceable, forms the interior limits of the upraised lands. On the eastern parts of the Island, where the soil is sandy, a difference between the older and newer is scarce traceable. But on the western and northern, the purer quality of the clay in the new lands distinctly marks off their soil from that of the older.

Throughout the soils of Chedoooba is a large admixture of stones, with exception of those of the sandy plains eastward. They are generally small angular fragments of a soft greenish sand stone, and present no obstacle to cultivation, (except where large and numerous, as noticed above) the effects of exposure to climate evidently breaking them down into rapid composition with the soil.

Large quantities of Coral and Juadrepore are distributed over all the upraised lands. The clayey nature of the soils makes them very tenacious of the rains, for which reason they are well adapted for the construction of tanks, either for irrigation or for the supply of the inhabitants. No water for the former purpose is at present required, for the latter, sufficient is found during the dry season, in the holes of the aullahs, and other natural reservoirs, and in the few springs which exist on the Island. The clay base of the Chedoooba soils contributes much to endue them with a great permanence of productions.

They are not manured for cultivation though under yearly tillage, nor is a change of produce, as a relief to the soil, any part of the system of agriculture pursued, nor is the plan of exhausting the soil, and then allowing

it to be fallow for a season, in practice, year by year the same land yields its single crop in due season; the amount which is exacted from it, and to which it is fully equal. Lands in fallow are observable, sometimes extensively; but on enquiry the account always given of them was either that they had fallen out of cultivation from decrease of population, consequent on long continued political disturbance, or that they were lands cultivated for a season by settlers, who had after a time returned to the communities whence they had issued.

From natural causes connected with the character of the soil, and from a practice in use among the people, all the cultivated lands are strictly speaking subjected to an annual process if not of manuring, yet of an addition into the body of the soil of that which must greatly tend to the same effect. The heat of the dry season covers the face of the land with a tissue of deep cracks, in these the decay of leaves, grass, &c. during that season, makes a considerable deposit of vegetable matter.

It is also customary with the natives to burn their paddy stubble, and grass lands immediately previous to the monsoon, whose first rains before closing the fissures, wash into them the ashes thus formed—with regard to the grass lands they are burnt expressly with the view of improving the future crop, and the same benefit is doubtless effected to the rice land by the practice.

Its effect is particularly beneficial to the upraised plains, by assisting greatly the decomposition and dispersion of the calcareous matter upon their surface, and which must contribute largely to bring them into a cultivable state. To illustrate the gradual effect produced by the above means on these particular lands; it was stated to me by an eye witness that the upraised plain of the N. W. part of the Island was 15 years in acquiring its first clothing of grass, not only is it now covered deep'y by that production, but many parts have for years yielded crops of rice, and all might do so. Jungle also is fast forming over it. Some parts of the low lands, both new and old, presented a sort of peat soil, still moist in the middle of the dry season, and affording luxuriant and green pasture. These grassy patches were most observable in the Krae-rone circle, which divides, on the north face of the Island, the more clayey soils of the west, from the more sandy ones of the east.

Rice is the staple produce of Chedooba. It is grown on all the level lands which form a land of more or less width around the Island, to which at present all cultivation with slight exception is limited. The yearly amount of this necessary produce varies, more through the fitfulness of temper of the people, than from any irregularity of the seasons. The

revenue claims must be defrayed with the proceeds of a portion, with another portion the family is to be sustained, the overplus purchases the necessaries of the family, and with no people is the list of these a smaller one.

From the more populous Eastern circles of Krae-rone, Inrooma, and Jueng-breng, a large quantity of rice is annually exported, partly in native vessels, which come for it from Akyab, and from the western parts of the Bay of Bengal, and partly in native boats, which come for it from Ramree, Sandoway, Gara, and sometimes from Bassein. The vessels from the westward, and the boats from the eastward generally purchase on their own account, the former bartering some few country goods. It is common for native merchants, or their agents to visit the Island from Akyab, or Chittagong at the season of gathering in the crop, and purchase it up from the different villages, giving a certain amount of earnest money, when it is subsequently collected at a convenient spot for shipment, and vessels sent to take it off. I was very anxiously enquired of by two parties, one from Akyab, the other from Ramree, thus engaged, as to the prices of the grain's market at Singapore, whither both were bound with their venture. A small barter traffic with rice is also carried on by the Islanders with their neighbours of Ramree mainly for fowls.

The western and less populous villages of the Island are also annually visited to see if they have grain to part with, a circumstance depending entirely on the above peculiar temperament of the people.

But independently of the superior advantage to the eastern inhabitants afforded them for a larger rice produce, in the greater extent of their plains, they enjoy also the great benefit of having those plains intersected by deep creeks, generally with a bar at the mouth requiring the assistance of the tide to pass over, but of considerable depth within, where country boats of the largest size, may in perfect security take in their cargo, in the manner pleasing to both parties, quite at leisure. For large vessels also, especially native ones, the anchorage in the straits is safer than that on the western coast, on which although there is anchorage every where, practicable and safe, in the fine season, for such purposes, yet the want of creeks wherein to keep them safe in the monsoon, at present prevents the inhabitants on this part from having any boats for shipment of cargo, which must therefore be taken off at the risk of the purchasers in their own. The rice of Chedooba is considered of very fine quality; a considerable quantity was purchased for the use of the crew of the 'Childers,' and the native

boats employed with her ; the price given was 1 rupee for a basket and a half or 90 lbs., this was cleaned ; grain paddy was at a much cheaper rate.

Both with regard to soil and produce, what has been hitherto stated of Chedoooba stands also true, of Ree-queng or Flat Island, its dependency, and close to its southern shore.

The adaptation of the lands of Chedooda to the culture of rice, over those parts where it is now grown, is so clearly shewn by the quantity and quality produced, that it would seem hardly to warrant any expectation of benefit to be derived from change of produce to be made on them, and those of like character. To such a change also the preoccupation of the present lands in this produce, and the necessity (if practicable) of instructing the natives in the village of any new one in its place, present obstacles difficult to encounter, if not insurmountable.

In considering therefore for any general improvement in the agricultural value of the Island, as connected with the grain in question, regard can only be had to the extension of its culture where practicable, or to an improvement in the method of it, if necessary. On this latter point I am not competent to speak. On the subject of its extension I may say, that by observation made in passing through the country, from four to six times, the extent at present under tillage exists as waste land, applicable for rice. Limiting its cultivation to those flat plains where alone it can be extensively carried on, so that, assuming all rice land to be most profitably occupied in this production.

That the method of tillage does not admit of material improvement, and also, that of this grain no second crop can be produced in one year, and the above estimate would form the greatest probable increase of annual value derivable from this source. It might indeed be increased if a second crop of other produce could be procurable from the grounds, but even for their full occupation in the staple produce, European energy, intelligence and capital must supply the means.

Tobacco forms the next principal produce of Chedoooba. In general its cultivation is confined to small gardens of about a rood each, in the immediate vicinity of the villages.

The gardens are all clearly kept, and a lighter mould with more vegetable matter in it, is preferred for their soil. The plants were much closer together than I have observed them to be cultivated in Syria, and the Levant, and I think must want light and air in ripening the leaf, as well perhaps as room for arriving at full size.

I found but one spot on the Island where its cultivation was at all extensive ; this was in a small valley about a quarter mile in width, in the

interior of the Island, situated high, and near to the large volcano of Ineng-brew, though in the Inrooma circle. The soil was an alluvial one with a large proportion of clay. A stream ran through the valley. Here were from 8 to 10 acres of tobacco gardens, the plants with much more room given to them, and this spot I was told produced the finest on the Island.

The Tobacco of Chedooba is highly prized, and deservedly so. I procured a quantity of it to be made up into cigars for my own use, and was both surprized and gratified to find among these, several of as high and delicate flavour as any from the Havannah which I had ever tasted, and for the best of which, but for the manufacture, they might have been mistaken by any one, not knowing whence they came. The Tobacco of which they were made was grown in the neighbourhood of the South Hill, and on examining those which gave such satisfaction, they appeared to be made from leaves larger and riper than most.

The native, though never without a cigar from the time even before he can speak, does not smoke pure tobacco; the stems and roots of the plant are cut up into shreds, and with a small proportion of the leaf, enrolled with the leaves of a plant supplied from the jungle, in a wrapper of Tobacco. He cannot therefore be considered a judge of the quality of his own produce, by those who use the purer article. The leaf when gathered, is dried in the sun, and when dry, strung through the stem upon slight skewers of bamboo near two feet in length; these again are woven together with one or two strips of the same material into bundles of between 2 and 3lbs. which sell for our rupee each. This is the preparation of the larger leaves, and is for sale, the refuse supplies the family stock.

The whole of this produce which, from what has been said, will not be concluded to be extensive, is disposed of from time to time along the neighbouring coast, and the Island of Ramree, some of course finding its way further, but at present with exception of the larger cultivation mentioned, it is grown in sufficient quantity only by each family, to be kept instead of ready money, wherewith to supply the different wants or wishes of its owners, its quantity and estimation always making it an article of ready sale or barter.

Tobacco was always found growing on ground perfectly flat. It may be that the heavy rains of the monsoon oblige this, in order to prevent the plant, if on a slope, from being washed away, though this was never assigned as a reason, but simply convenience. Should the above supposition have weight, it would of course tend to limit the cultivation of a plant which necessarily standing very open, is therefore much exposed to such peril

Still there exists throughout every part of the Island, waste lands whose soil would be found applicable to the cultivation of tobacco to a very large extent, even if subject to such limitation, and I am strongly impressed with the opinion that such cultivation would prove one of, if not the most valuable to which the unoccupied lands (not being rise grounds) could be applied. The present extent in which this plant is grown over all parts of the Island, I incline to look on in the light of a experiment only, but one truly valuable, at once for its extent, and its success, and therefore affording data under prudent precaution of similarity of soil, &c., on which to found expectation of great profit to be derived from its extension, in which case the present experience of the inhabitants in its culture, even when necessarily modified with view to improvement, would be found a valuable co-operation. It may be that my own estimate of the flavour of the tobacco I have spoken of above, has been erroneous, but even if so, the general mildness of all Chedooba tobacco, when improved by greater attention to its culture and preparation, would give it an extensive preference over the strong Manilla; whereas should it be found practicable to grow extensively a leaf of the flavour and quantity which I think to have found in the above specimens, Chedooba would become a formidable rival to the Spanish settlement.

The employment to be given by the manufacture of the leaf, if extensively grown and saleable, would add another source of benefit to be derived from such a step.

Cotton.—Is grown in several parts of Chedooba; generally spots in the jungle are selected and cleared for its cultivation, which is however very limited, not affording employment by its manufacture for the women throughout the year. The surplus required to keep the looms (of which almost every family possesses at least one) at work, being imported from the main land.

Excepting a few plants in the gardens of the villages, I found no cotton in growth, though land were being cleared for it in several parts, and some of them extensive. Those few plants appeared to thrive well, but from the shortness of the staple of that which I found in use, whether of the Island produce, or the Mainland, I conclude that what is at present grown is as inferior in quality as limited in amount. It was however very clean and white, the articles manufactured from it, a few coarse cloths for the person. The soils on which the best Cottons of India are grown, I have understood to consists generally of a rich deep mould; if such be the case, and necessarily so, for the perfection of this plant, I fear that Chedooba holds out no prospect of benefit from any

extensive culture of it. That soils exist in the Island, where it may be grown with advantage to greater extent, and of better quality than at present, I doubt not, but I think that the advantage to the Island would be limited to the production of a supply of it sufficient to give fuller employment to the native looms, as at present wrought for domestic purposes, without recourse to importation.

In the gardens of every village Sugar Cane in small patches is to be found; it is mostly of a red kind, small, and woody in stem, with short joints. In the Eastern parts of the Island it is grown to extent sufficient for the production of a few maunds of jaghery; but in the Western parts, where it is of more recent introduction, a sweetmeat for children is the highest object of its growth.

As with the Cotton, and for the same reason, I incline to the opinion that Chedooba does not hold out the prospect of any extensive growth of the Sugar Cane.

The only place where I have seen this valuable produce flourishing in this part of the world has been in the Amherst Province of Tenasserim, where it was luxuriating in a soil very different from any which were found, or are I think to be found, in Chedooba, a dark rich vegetable mould. In the neighbouring Island of Ramree it thrives well, and it is fair also to state that not only is the Chedooba plant one of very inferior quality, but that not the slightest trouble in the way of cultivation is taken with it; portions of the cane being merely put into the ground in the month of May, and left to nature to bring to perfection. That therefore as with the cotton it might be both improved in quality and increased in quantity, admits of reasonable expectation. But there seem to be insurmountable obstacles to Chedooba ever becoming of importance as a Sugar Island, arising from the unsuitableness of the soil in general, and, (under the supposition of the occupation of all rice grounds in the cultivation of that staple,) the too limited extent of surface for such purpose, clear of steep hill sides, which would remain. In passing through the jungle on one occasion a cleared spot of some 4 or 5 acres was found occupied half with hemp, and half with indigo.

This was a speculation of a native, and the unusual enterprize it discovered promised to bring its reward, as both crops appeared healthy and flourishing. The planting of Indigo is very limited, the plant of an inferior quality, and its preparation a very clumsy operation. It is not grown for export, but sold in the different villages to dye the produce of the native looms.

I could not learn that the Hemp was a more common production than the other; in fact it is grown in small quantity only on the Island, to whose inhabitants it supplies material for the few nets they possess. I had no means of judging of its quality, other than from the healthy appearance of the plant, which at least seemed suited to its soil, and therefore to afford prospect that this produce might with success be more extensively cultivated in portions of that district of the waste lands which lie between the available rice plains and the steeper hills. In conclusion of this notice of its agricultural produce, and in contemplation of plans for the future improvement of the Island in this regard. the general impression resulting from examinations of its soils, and consideration of the character of its inhabitants, was that such object would be effected in the best and readiest manner by increased care and attention given to extension and improvement of crops already grown on the Island, rather than by attempts to introduce on it extensively any new produce.

A good supply of cattle exists on the Island. The buffalo gives his strength for the more arduous agricultural labours. The lighter cattle draft the produce in hackeries with which the Eastern villages are well supplied. The breed is small, but strong, and supplies very sweet meat. Labour in connection with agriculture is however the only demand made on them by their masters.

Fruits are not very numerous on the Island, unless the multifarious produce of the jungle, familiar alone to a Mug appetite, is to be honored with the name. In the struggles of past times between the Mug and the Burmah, Cheedooba had its share, and from one of the measures adopted during those times in connection with this head, viz., the destruction of all its cocoa-nut trees, that they might afford no sustenance to an invader, it still suffers. Of this valuable fruit therefore there are comparatively few, mostly young trees, but they thrive luxuriantly, and a few years more if attention be paid to their increase, would see the Island supplied with them in quantity sufficient for more valuable purposes, than that for which alone it is now esteemed—the means of making complimentary presents.

The plaintain flourishes well; but is not much cultivated, and is generally an inferior sort, containing a large hard seed.

The pappia is common, and large in all the village gardens.

The tamarind flourishes in great luxuriance and grows to a large size. This tree almost universally supplies shelter and shade to the villages.

Its fruit is not much used by the natives. It is found growing indigenously on the second or old beach, but was observed nowhere else; with scarce an exception, this being also the situation of the villages.

The mangoe grows wild to a great size. I have measured some of more than 4 feet diameter—its fruit is very inferior, nor is it attempted to be improved.

Both the lime and the orange are found in many of the villages, and thrive well.

The orange is of that sort named elsewhere the sweet lime, and if extensively cultivated would form a very grateful addition to the luxuries supplied to the capital.

Vegetables as fruits, are also of small amount. But here again as with his orchard, the Mug looks to the jungle to make up the deficiency of his garden produce.

Yams are good and large, but plentiful only in the eastern parts.

Many species of pumpkins and gourds are grown in almost every garden; brinjals are very fine but not in plenty.

A small shalot is grown in the gardens generally, and some fine onions, which I was taking with me for my own use, were both so much admired and demanded for seed, that this improvement to the Kitchen Garden, will probably in due time become general.

Chillies of all sorts are in every day demand for the curry.

In introducing to notice the more natural productions of the Island, in the vegetable kingdom, it may be well as before first to speak of the soil in which they are found.

This is with little exception of one character, a loose friable earth of light yellow colour, having the general clay base much modified with decayed vegetable matter, the angular fragments of soft sand-stone having passed from a greenish into a dirty yellow colour, and being in a state of rapid decomposition.

The exceptions to this were found in a few spots to consist of a soil bearing more of the character of mould. The above soil extends throughout the interior parts of the Island, embracing all the hills higher and lower down to those flatter lands which have been noticed as applicable for the extension of rice cultivation, and constitutes that of the jungles, which are co-extensive with it.

These in their general character are open, consisting much of detached clumps of bamboo or of trees from 1 foot to 18 inches in diameter, well separated below, but in their branches having creepers thickly entwined. Throughout the lower jungles, open spaces, some deserving

the character of small plains, are of very frequent occurrence. On the higher hills, the trees are closest of growth and largest of size, but still clear of understuff. Throughout therefore, no serious obstacle is presented in the task of clearing the land for cultivation,—a Mug, with a good *dáh* felling the trees over half an acre a day, and a footman may penetrate without obstruction in any direction.

The tops of the highest hills were visited with ease, save from the steepness of ascent, parts being traversed, which the superstitious fear of the Mug would never have permitted his voluntary approach to.

Timber of great size, and some of valuable quality, is to be found, but it is confined to the very summits of the highest hills, and is therefore partly inaccessible, nor would its amount ever remunerate the labour of constructing roads for its transport. The soil in which these grow is of the same nature as that described above, but within a few hundred feet of the summits, all of which are very steep, it is piled up in the loosest possible manner. The stroke of an axe or *dáh* on an extensive hill top, would so shake it for a space of 150 yards around, as to make observation in the quicksilver of an artificial horizon impossible.

Precisely at the spot where this loose texture commences—commences the growth of the large timber, increasing in size thence to the summits, and from the trees not being deciduous (or at least not so at the same season) a most marked line of separation is thus traced out between these and the smaller leafless jungle below.

The wood oil tree was the most conspicuous in growth and size, of the larger trees of these summits.

One was felled on the west hill, which measured in diameter at the respective ends, of a 60 feet length, 4 feet 6 inches, and 3 feet 6 inches, and another is left standing as a mark, on the summit, which measures 21 feet 4 inches in girth at 6 feet from the ground. The wood of this tree will not, I fear, be found valuable as timber, but its produce, the wood oil, has yet to be better appreciated than at present. This substance is produced by cutting a hole into the body of the tree,* and kindling a fire in it; the flat floor as it were, of the hole, has a groove cut in it, which receives the oil as it crudes from the wound, and whence a split bamboo conducts it to the pots placed for its reception; the quantity thus yielded from a large tree is surprisingly great. In felling the above mentioned individual the oil ran in a stream from it, and it must have contained even tons. The strict propriety of designating it an oil may be doubted. It has always

* See Dr. Spry's Visit to Arracan, No. 110.—ED.

seemed to me more like a varnish; it speedily forms a highly polished surface on wood work, and has a fine aromatic scent, not unlike that of cedar; mixed with reeds and dried, it makes a brilliant and fragrant torch. The colour of the wood is a dull pink.

In the course of clearing these summits for observations connected with the survey, many other trees were felled exhibiting characters apparently valuable as timber. Among the natives there were differences of opinion about their names, and waiving even this obstacle to any description of them, the remark already made of the difficulty opposed to their being brought down, renders such attempt unnecessary. The oil trees would be found most valuable as a source of supply for that material, and perhaps many of their neighbours also would be found more useful living than dead, by the produce they may be found to yield. One of these, of large size, and with a bark similar to cork, was found to produce caoutchouc in great abundance. On cutting through the outer rough coat, a soft inner one, nearly an inch thick, is found closely attached to the more solid wood; on wounding this, the caoutchouc exudes freely, of a consistency and colour like thick milk. The tree was much avoided by the natives on account of the noxious quality of this milk, which if by accident entering the eye, on the tree being struck, so as to wound it, was said to produce certain blindness.

Another tree of very large leaf but moderate size, was also much avoided, and great care taken in felling it, to prevent its juice from touching the skin, which it was said to blister and poison. The adhesive quality of this substance was therefore more taken for granted than proved.

A plant, with the appearance of a cactus, but growing to the height and size of a tree, and known perhaps generally under the name of *Sisso* (not the timber tree of that name) yielded the caoutchouc in the greatest abundance. On severing a leaf, it ran forth in a small stream like milk. Many of the creepers also contained it in large quantities, and in one spot of the jungle of the Krae-rone Circle, I found the Caoutchouc tree of South America, affording prospect that as European intelligence and enterprize became more attracted towards the products of India, that continent may some day find its exclusive trade in this every day increasingly valuable article, formidably disputed. The wild cotton tree grows to a great size, and at the time seen was covered with a mass of its beautiful crimson flowers and flocks of birds. Its wool is sometimes used for stuffing pillows or beds.

The Gamboge tree was found of large size, and in considerable quantity, in clearing the jungle from the summit of the N. W. Peak; it was well

known to the natives; but no use is made of its beautiful gum, which covered the stems in considerable quantities. It lives in the higher jungles.

It is not doubtless the only tree in these wilds yielding a valuable gum, but want of acquaintance with botanical science prevented researches of that kind, which might have led to useful discovery. The safety and facility, and even enjoyment with which such researches may be carried on in the fine season, in the woods of Chedooba, seem however to point them out as a spot very eligible for the careful examination of an able botanist, unless indeed they be considered too limited in extent to exhibit a sample of the general character of the jungles of this coast.

A very brilliant crimson gum was found to flow in great quantity from a large creeper (*Tallee-medzou-nowy*) which is very common. If dried speedily in the sun, becoming very brittle, but retaining its color, it is of very astringent quality, and is used in some diseases as a medicine by the native quacks.

I may not fail to mention another creeper, whose properties are as valuable as interesting, and not the less so from its being found every where, both high and low. It is truly a traveller's friend, and the wandering Mug well appreciates its value. With his *dáh* he cuts off a junk and quenches his thirst with its contents, a pure, tasteless, cool water, of which it contains as much as its large numerous pores will hold, and which are immediately emptied by holding the piece perpendicular. A piece about 2 feet in length, and as thick as a small wrist, gave rather more than half a pint of water. In the rainy season it would have given double that quantity.

In travelling through the jungles, the liquid of this water creeper (*Jabroon nony*) is the constant beverage of the natives, when not otherwise supplied with that necessary, and its universal presence makes him very independent in his choice of road.

The rattan is every where found in the jungles, and performs all the ordinary duties of rope; it grows to a great size; two were taken from the West Hill measuring 114 feet in length, and $1\frac{1}{2}$ inch diameter.

Although Chedooba may not be looked to for supplying valuable timber to other parts, yet for its own consumption, and most, if not all domestic purposes, it possesses amply sufficient to meet any demand. For such purposes plank may easily be brought down from the hill, whence the whole tree must be immoveable. The lower jungles contain woods, perfectly adapted to such uses, and in those of the Eastern Plains was found the *Thew-gaan* growing plentifully, some of the trees between 2 and 3 feet in diameter, and which itself would supply material for almost all

purposes. The wood of this tree is hard and close grained, of a yellow colour and most durable. In the Southern Provinces of Tenasserim it grows to an immense size, and also in the Sandoway district; hereafter its qualities may be appreciated by other than the Natives, with whom its durability has given rise to the proverb that 'a Cemoe of Thew-gaan lasts 99 years.'

It has been thus seen that the soils of Chedooba to the very summit of the Hills, and even there more so, are both productive and easily wrought. That therefore in any future agricultural improvement of the Island, man's industry will lay claim to a very large portion of that extent, now entirely in a state of nature, there can be no doubt; and over the face of all the lower hills, crops of various produce take the place of the jungles, which now occupy them. Such cultivation, even though limited to the extension to the greatest amount practicable of those products which are now but so partially grown on the Island, would therefore leave but a narrow space to be provided for, below those steeper, almost precipitous hills, which must always be given over to nature whereon to maintain supplies of timber and fuel. What such a space might be most profitably occupied with, it is perhaps attempting to look too far into the probable future, to make it other than presumption to speculate on. Yet in considering the nature of the soil, and comparing it with that of the spice gardens of Penang and Singapore, it has seemed at times likely that a similar produce might be found practicable here. For taking into consideration the very great disparity in the mode of the distribution of moisture between the two localities, still the pepper vine flourished at Sandoway, and at Mergiu, if not Moulmein; places all subjected to the same peculiarities of season. The growth of the Nutmeg, Cloves, and Coffee, are not yet despaired of.

Of the productions of the animal kingdom, the Island exhibits but a limited variety—under the head of agricultural produce it has been already mentioned, that large cattle thrive, and are plentiful and might be no doubt much improved—not only at present are they not killed for food, but even their milk is not used, and authority was obliged to be exerted in order to procure this luxury in the midst of herds.

The use to which they are applied has in the same place been already noticed, and beside them there are none.

One pony lives on the Island, the property of the Soogrees, and two goats are claimed, as belonging to the party of police, which is stationed at the chief village of Chedooba.

Of wild animals, the deer is the largest and most plentiful; they are very numerous throughout the Island, though I never either heard or saw but one species, that which is generally known as the 'barking deer.' The natives run them down with dogs; they have no means of shooting them. The flesh was found less dry and unflavored than was expected.

Next in size and number to the deer, is the wild hog, the only species on the Island. They are not large, but numerous, especially in the jungles which lie closest to the rice lands, on which they commit heavy depredations, and our assistance was frequently invoked to destroy at least some of the enemy. But in general the labour of the day was deemed enough for our party without trenching on the hours of rest, which was necessary in order to comply with the request.

Jungle cats are found but are not numerous, but one was ever seen by any of our party.

Squirrels are plentiful, and of large size, though of but one species; a dark brown in colour throughout, with exception of the throat, and a narrow stripe along the belly of yellowish white. One was shot of the size of a full grown rabbit; it was a male, his lady in company was of more delicate size.

Monkeys we heard of, but I much doubt their existence on the Island, at least it is strange that in so long and extensive a traverse of it, such an animal was neither seen nor heard.

The freedom from any formidable wild beast is a circumstance of advantage in these countries, which may not be passed over without remarks; it contributed largely to the comfort and freedom with which we were enabled to penetrate throughout the Chedooba, forming a source of congratulation when obliged to take up a night's lodging, or a day's journey in the jungle.

The Natives state that a tiger did once attempt a landing on the Island, but fortunately being seen while yet swimming towards the shore time was afforded to the inhabitants of the nearest village to prepare for his welcome, and before he could gain footing, either for attack or escape, he was cut in pieces with their dâhs, since which, his example has never been followed.

I know not how far the swimming qualities of a tiger may bear witness to the truth of this story, but the feat in an opposite direction was safely performed by one of the elephants which were placed at our service, which after breaking from his ropes, swam the straits, and landed safely on the opposite coast of Ramree, a distance of seven miles at the least, where he was recaptured and sent back.

Of reptiles, one snake was seen, and a few lizards and insects, the most numerous and beautiful are the butterflies, which were found even on the highest peaks. Bees are plentiful, but the jungles alone supply the honey, which is very sweet and good, and serves throughout the Island in the place of sugar.

Fish forms a very important part of the diet of the Mug, and mainly in this view, are the villages of Chedooba formed around the shores. It is very plentiful though not of any great variety. The most common is a species of bonetea, a muscular fish of rapid motion, and great strength, though seldom arriving at a weight of 4 lbs. It has a very thick smooth skin, without scale, and is of silvery white, longitudinally spotted with blue. On the western coast in the sandy bays, they are very numerous, and are taken in great plenty with hook and line.

The bamboo supplies the fishing rod, and in the evening, when most readily taken, the shore may be seen with 20 natives in a line from the nearest village, as close together as they can stand, up to their middles in the water, with their baskets slung on their backs, and casting their lines as rapidly as if fly fishing, laughing and joking at their success, without the least fear of driving their prey away, though they must be among their legs. The flesh of these fish is very firm and nutritious.

Very great quantities of a tiny little fish, most similar to, if not in fact, the Anchovy or a small Sardine, are taken on the same coast. They are dried in the sun without any preparation, a day or two's exposure being sufficient for the purpose, and exported in great quantities to Ramree and the neighbouring coast; each family also of the western villages where it is taken keeps a large supply, and demand is extensively made for them by the less fortunate communities eastward, so that they form a valuable adjunct to the resources of that portion of the inhabitants in whose neighbourhood they are common. The method of taking them is perhaps peculiar, and forms an interesting and lively scene. The morning is the time of the best 'take,' at which time, and when near high water, young and old assemble on the sand in groups, with flat open mouthed baskets of bamboo work, awaiting the opportunity for a catch. This occurs when the shoals of tiny fish are driven for supposed safety close into the beach by their larger, persecuting, and ravenous brethren. Then away dashes the nearest group of expectants into the water to the back of the surf, which is constantly, though not heavily rolling in on the coast, and driving back the original pursuers, face round in shore and place the flat mouths of their baskets in line together, just outside the

retiring wave, receiving from it, its finny contents. Sometimes more than a gallon will be thus deposited in a single basket.

The uncertainty as to where the shoal will come in, and the rapidity and ability with which the fortunate group take advantage of their opportunity, afford all the excitement and amusement to these cheerful people of a game of chance, and cannot be looked on by a stranger without interest. Flocks of cranes, crows, kites, and gulls of many sizes, colours, and voices, looking out for the stragglers on the sand, who have escaped the mouths of the fishes and the baskets, form an addition to the scene.

The grey mullet of good size and flavour is got from the creeks of the east side of the Island. Rock fish are plentiful, but not easily taken; when intended to be preserved, they are split into quarters, kept together at either end, and then opened by strips of bamboo, and the whole hung up to dry in the sun. Skate were frequently seen, but none caught, they were often observed to make very high, though clumsy leaps, a feat not often I believe, practised by flat fish. A fish of considerable size from 12 to 20 lbs. weight apparently, and in form resembling the salmon, was frequently seen of an evening performing very astonishing leaps. They were always quite perpendicular, and therefore appeared as a gambol, more than an effort to take prey, and sometimes extended to a height of 30 feet.

Of shell fish we found craw fish and prawns, the latter of great size and very delicious; they are limited to the creeks of the east side of the Island, where also the one in the neighbourhood of the Meug-breng village, possesses truly fine oysters. They are large, but of a flavour as delicate as our own Colchester luxury. They were in high condition when we visited their neighbourhood, and it may be lamented that they are not more generally known, and attempts made to grow them elsewhere. They have been transported to Kyouk Phyoo, and do well there.

Turtle are common, and are taken by the natives on the sand islands and bays. They are of large size and of good species, but I can make no mention of their quality as food.

Many beautiful and valuable species of shells are to be found on the flats off the North Point of the Island, where however but little leisure or opportunity of dredging for them was afforded.

Fowls are plentiful on the Island, and supply the most solid food to which the natives are accustomed. The demand for them by our people raised the price latterly from 18 to 13 for the rupee. They are of good size, and good flavour.

Of wild birds, the Sarus is perhaps the largest on the Island, and is plentiful. They are common in other parts of India, and are, I believe,

good eating. There are a great many varieties of the Crane, some of very beautiful plumage and great size. These constitute the greatest portion of the feathered inhabitants, and would supply perhaps some new and valuable varieties if not species; Doves are very numerous; a small green Parrot is found, and some few green Pigeons were seen. But in general, other than have been mentioned, the birds are of those species most commonly met with in these climates. The jungles are however scantily peopled, though I may not omit to notice one which, with its sweet and soft note late in the evening, often gratified us, and was deemed not an unworthy brother songster of the Nightingale.

The Mineral Kingdom.—Though bare of much value, exhibits specimens of some interest.

Nodules of Iron ore of rich quality, are, on search, to be found generally either embedded in the greenish sandstone, or having been detached from it.

In the former state they were found most numerous, on one of the reefs of the North West Point called the 'Saw reef,' and in the latter on the North beach. But in neither case in quantity sufficient to make them valuable for other objects than those connected with science.

Specimens of copper ore, and some few of silver, were found on careful search, lying on the barren surfaces of the different volcanoes. They are all of very small size, and their amount limited as those of iron, and like them give no indication of the existence of the ore to any greater extent. A piece as large as two eggs was recorded as the largest ever found.

Petroleum is found on the Island, and might be extensively produced.

Two wells sufficiently near each other to afford the conclusion of their possessing one common source, exist in the Krae-rone circle, yielding annually about 60 pots each. A third is found in the 'Mroomce' circle, but it has been destroyed by fire, and yields nothing, being the property at present of no one in particular, the soil around it, is, however, full of the oil. The fourth and most extensive is in the Fangroa circle, and yields near 200 pots in the year.

The method of collecting it is simple; the earth is turned up to a depth of two feet, and a bank of soil raised round a square of about 20 yards, thus disturbed, so as to form it during the rains into a shallow pond of about the above depth. The surface of this pond is in a constant state of ebullition from the escape of gas, with which comes up the Petroleum.

It collects on the surface in three different forms. A green fluid oil first spreads itself over the spot where the gas is bubbling up; as it extends, its edges exhibit a brown curdled substance resembling half congealed dripping, and amongst this, as it becomes thicker, is seen gathering in spots, a dark brown substance of the color and consistency of molasses. This latter is used to preserve wood, to saturate paper for umbrellas, and is sometimes burnt. But the fluid of green color, is that mostly used to supply lamps. The curdled substance is used with the dark in the coarser purposes to which it is applied. This is the least valuable, and sells at 5 pots for a rupee. The other two at 3 pots for 2 rupees.

A bamboo is used to skim the surface of the ponds, and bring the substance to the bank, it is scooped up with a cocoa-nut shell and put into the pot. It floats so lightly on the water that this process is quickly and effectually performed. The break of day is the time chosen for the operation as from the cooler temperature, it is then of harder consistence on the water, and easier and cleaner skimmed. In the heat of the day it becomes so fluid as to make it difficult to collect without a large proportion of the water.

In the months of March and April the pond gradually dries up, and the oil can then be no longer collected from out the soil. The pond is then dug, and the whole soil in it as much disturbed as possible; on this operation depends the quantity to be yielded during the next season, and the deeper it is dug, the larger will be the produce; while on the other hand, if it be neglected, which is most commonly the case, the quantity of oil to be collected will be very materially diminished. A sort of superstitious fear is attached to these ponds, and on no account would a native dip his foot in its water, though he will not hesitate to dig the soil when dry, nor to handle its produce, to which no sort of deleterious property is attached. The state of ebullition without apparent heat may occasion this feeling among them.

The ponds are surrounded by a rough hedge of stout sticks, to preserve them from the intrusion of buffaloe or deer. Insects were seen in them. I had no means of collecting any of the escaping gas, which I should otherwise have done, but no heat perceptible at the surface is employed for its extensive developement. The Thermometer where the greatest ebullition was going forward shewing but two degrees more than the atmosphere, viz. 74°.

No doubt this mineral produce, might with ease, and little expense, be increased to a very large amount, and the oil has yet perhaps to be

better known, and better appreciated than now, when its value will in all probability be much increased.

I know not whether it has ever been thoroughly analyzed, but the almost pungency of its scent seems to proclaim the presence of a large portion of Naphtha.

In composition it differs from the tar produced from the wells of Zante, or the pitch of the Lake of Trinidad, partaking in all probability the character of the oil, which is found in the wells of the Irrawaddy. The material from these is in considerable use in our Tenasserim Provinces, and its native country, as a preservative of wood from the attack of the white ant, which it effectually prevents, and it is in considerable demand in the construction and preservation of the wooden houses of those countries; affording reason to believe that this, its well known and well tried property, might, with benefit, be more extensively made use of in other places. In a dwelling house perhaps an objection against the painting of the beams with petroleum might be supposed to lie in its scent; though this may prove but a supposition, and at any rate it can form no objection to its use in stores and godowns, and other buildings of that nature, whether public or private. The expense annually incurred in Calcutta for repairs, called for, from the above cause of destruction, where it is necessary to examine, if not renew timber once in 3 years, seems at once to point out an extensive sphere for the application of this, its valuable property, in connection with which is also its employment in the preservation of spars for shipping.

The extension of the wells which are all situated in the jungles, and an increase of their depth so as to hold water throughout the year, are simple means by which this produce of Chedooba might be at once largely increased to meet such extended demand, at present I believe the use of the petroleum to be almost entirely confined to the limited application it finds among the natives. The only other mineral production it remains to notice is coal. This, or a lignite, was found about a mile within the western beach in the Circle of Tang-roa.

It had been known for 2 years, and had been dug into, to a depth of perhaps 5 feet without exhibiting any improvement over the surface specimens. It was found shewing itself for a distance of 20 yards in an east and west direction. Its situation, a little above the water mark of a dry creek, formed by the first and second lines of Hills, and its dip an angle of 45 into the body of the latter, which rose 800 or 1,000 feet above the spot where it was shewing. In formation it consisted of a series of layers varying from $\frac{1}{8}$ of an inch to 3 inches in thickness, se-

parated from one another by their laminae of ferruginous sand. It was very brittle, with a dull fracture, and smouldered, but would not ignite. Neither from its situation nor its quality does it promise to become of any value.

DIVISION 4.

Climate.—Chedooba, in common with the Arracan coast, has been generally considered as possessing a climate peculiarly fatal to Europeans, and the mortality of the Troops who occupied it during the Burmese War has given but too painful cause for the opinion.

Nevertheless I cannot but think that its insular situation, and its freedom from that extent of muddy creek, and Mangrove swamp, which peculiarly characterizes the coast of the mainland, together with the greater openness of its jungles, must be the occasion of some difference between them, and that in favour of the Island.

Its seasons are those of the adjoining countries, and may be divided into wet and dry; the rain commences its visit in the beginning of May, with variable winds and intermittent showers, which, increasing in frequency and duration, introduce the deluge which pours down incessantly from the middle of June to that of September, during which period 250 inches of water fall. Thence to the month of November is occupied with the gradual taking off of the rains, which from that month cease till the following May brings them round again.

In every country subject to such periodical rains there are two seasons when the sickness, which is the peculiar one of the climate, prevails, viz. at the commencement and taking off of these rains. Even in those countries which, but more partiality, are subject to a wet and dry season, as Italy, the Levant, and southern shores of the Mediterranean, the same effect is produced, and spring and autumn there, bring with them, their ever accompanying miasma fever. Under the effect therefore of a tropical climate, where the change at this time, in operation throughout the whole vegetable kingdom, is so much more extensive and violent, the effect of the greater developement of noxious vapour, must be necessarily looked for; and accordingly these periods are found to be the sickly seasons of Chedooba, and the coast around, and their regular return calls for great care and prudence on the part of the European, for whom, occupation of mind and body, as active and full as regard to unnecessary exposure will permit, may be strongly recommended then, as perhaps at all times, as a valuable addition to other precautions; as it has frequently been found that our sailors and soldiers, have suffered less from the

effects of climate when under the exposure, than when mind and body have alike been unoccupied and unenlivened.

Exposure to the direct heat of the sun of Chedooba, and its neighbourhood, is at all times of the year to be carefully avoided, and such imprudence will be the almost certain occasion of illness to an European, to whom the simple remedy of a chattah is always at hand; some peculiarity in the atmosphere appearing to make its rays more than commonly obnoxious at all times to his constitution; but this is more particularly the case in the months of March, April, and May, when the natives themselves are much concerned to avoid the intenseness of its heat. The mornings and evenings however, even at this time afford 4 or 5 hours, when all out door duties may be performed.

The above months constitute the hottest season of the year. The Thermometer in the day ranging at times to above 90°, but falling, from towards evening till before sunrise, down to a temperature, which is pleasantly cool throughout the night, a benefit enjoyed all the year round. On the main land, the nights at this season are frequently accompanied by a dense mist almost amounting to a rain, arising in all probability from the condensation of moisture, attracted from the large extent of water surface exposed by the numerous creeks.

Chedooba, with nights equally cool, and more healthy, is free from this peculiarity. But with the mainland, is, during the day, at this season, subject to a dry haze, at times to thick as so hide the view of the land; at a very few miles distant.

The heat at this time is greatly attempered by the fresh sea breeze constantly blowing, which gradually veering from south-west to north-west, with only a decrease of strength during the night, takes the place, at this latter point, and time, of the direct land breeze, which blows during the night in the cool season.

This cool season, the most enjoyable, and the healthiest time of the year, extends from the setting in of the north-east monsoon, towards the end of October, to the middle of March, during which time the climate is very delightful, the temperature seldom rising, excepting as the season closes to that of the summer heat of our own country. But the sun at midday is still very powerful, and direct exposure to it, to be avoided. This was the season during which I traversed the Island, and though constantly in the thickest jungles, sometimes by night as well as by day, I do not remember to have suffered a headache.

The sea breeze at this time sets in at 10 A.M., and falls with the sun, shortly after which a cool land breeze from the eastward takes its place, till

about 9 A.M., when an hour's calm is again succeeded by a breeze from the north-west. The change of temperature was found very great during this season, between day and night, with the exercise of walking, the lightest clothing was found most suitable during the day, but about two hours before sun set the temperature falls rapidly, and at night with the land breeze blowing, two blankets and a counterpane were not too much to prevent actual cold. This change must always be carefully met, by dressing in woollen, a precaution which should never be omitted.

The same peculiarity of atmosphere, which produces such ill effects from exposure to the sun, may also be the occasion of a greater amount of exhaustion (not fatigue) under the exercise of walking, which I experienced more in going over this Island, than I had ever previously found, in the few other parts of India yet visited. A remedy for this feeling was always found by application to the contents of a haversack, and the precaution was always taken of not setting out on the day's journey without the regular meal. It is not altogether from personal experience in this particular, during so limited a time, that I would express the opinion, that bodily exercise of any sort in this climate, requires for its support, at least by the European constitution, a generous diet. In its corroboration, I was informed, that during the time of service, on this coast, of the 65th Regiment Native Infantry, a very fearful mortality took place among the Sepoys, not so much from the actual violence of the prevalent disease, the well known Arracan fever, as from the consequence of its debilitating nature, from which the constitution of the Native would not allow him to rally, though always assisted by liberality administering strengthening medicine and means; while to this mortality among the privates, a strong contrast was exhibited in the constant good health of all the officers, throughout the whole period of nearly two years, a contrast attributed by the medical, and other officers of the regiment to the difference of diet of the two parties. During the exposure to which the crew of the 'Childers' were necessarily subjected in the execution of a survey on the coast, many cases of the same fever occurred, at the present time amounting to upwards of 60 in number, but of the parties so suffering there were but few who were not perfectly recovered, and at duty again in 8 days, a circumstance which I incline to attribute mainly, not only to the usual liberal allowance supplied to Her Majesty's seamen, but also to the endeavours (fully appreciated) to supply the crew with as much, and as great changes of good food as were, under circumstances, procurable. There must not be left out of view the great value of the facility of an immediate application, on first symptoms, to a medical adviser afforded in

a man-of-war. Nor again that of the precaution which the service provides under such circumstances, by the administering of wine and quinine to all likely to be exposed. This latter was found of great use, and is much to be recommended, while in regard to the other consideration it is right to notice, as tending to deprive this fever, of something of its formidable character, that in many cases, a simple dose of medicine, administered on first symptoms, has sufficed to drive it entirely away. One case only proved fatal, and with it were connected peculiar circumstances.

The climate during the period of the heavy rains is not an unhealthy one, it will be one necessarily of great confinement to the European, which is perhaps unfavourable, being inclined to attribute much value to personal exercise, but occupation by all who know its value, would not even at such time be found impracticable even for the body, much less for the mind.

The temperature during this season is cool, though the moisture of the atmosphere is very destructive to every thing but stone and metal. It is the time for the growth of the crops which we put into the ground just previous, and it is now that nature puts on her rich clothing of verdure; and vegetation is most rapid. It is accompanied by a constant breeze from the south-west. The natives enjoy this time as much as their Burmah brethren, and with their smallest children, like frogs, delight most in exposure to the heaviest falls.

Great importance as a preservative of health in this climate is to be attached to a very careful watch over the due performance of the digestive functions; both speaking from personal experience, and also by observation of our sick generally, it being found that inattention to this particular was not so much the occasion of dysenteric disease, as that it rendered the party liable to the prevailing fever, which was found to them a very intimate connexion with the state of the stomach, any derangement with the regular functions of which, if not a certain occasion, being at least a strong predisposing cause to taking the disease, and being found in all cases more than ordinarily its accompaniment.

My acquaintance with the climate of Chedooba is but small, and was limited to that of the best season of the year. I therefore would speak on the subject with every deference to the opinions of others of more practical knowledge, and extended experience. But as the result of what I have found and heard of it; I am strongly impressed with the opinion, that, employment for body and mind—to avoid direct exposure to the sun;—good (not intemperate) living; accommodation of clothing to

changes of temperature; careful attention to the state of the stomach; with due observation of these precautions, in aid of a sound constitution, the climate of Chedooba, would be found not only healthy, but at some seasons most delightful to the European.

The eastern parts do not enjoy so temperate a climate in the hot season as the western, being less exposed to the fresh sea breeze; and the immediate neighbourhood of the creeks would be found situations prudently avoided. The fine pulverulent soil in the east, by the quantity and penetrating nature of the dust it creates, is also at that season a very great annoyance; notwithstanding therefore the greater exposure during the monsoon, and that it is at present far less populous than the eastern. I consider the N. W. portion of the Island, as that which, at all seasons, would be found the most congenial to the European constitution.

While speaking of the climate of their Island, it is fair to notice its effect upon the natives themselves, as well as upon Europeans, and it was found that they also are subject, though but inconsiderably, to occasional attacks of the fever.

All the able-bodied men on the Island were employed with me on one occasion for a fortnight together, and therefore came under my direct notice, and though at hard work all day, and sleeping in the jungle at night, it came to my knowledge that fever had been taken by only one individual throughout that time, an old man verging on 80 years, and who ought not to have been present.

In traversing the Island throughout, I believe not to have omitted visiting any of its villages; and whatever sick were in them, always made application for relief, either personally, or by their friends. These cases amounted in all to four of fever, one of small-pox, one of dropsy, one of paralysis, one of blindness, and one of deformed limb, three cases of fever occurred also with our Bengallee attendants. The native population therefore seemed to exhibit no signs of a pestilential climate. While on the contrary, throughout the Island, they afforded the clearest and most extensive evidence of its healthiness, and suitableness to their constitutions, in the great number of old men and women, to be found in every village.

As mere old age entitles to the respect and deference of the whole community, the old people, as elders and leaders, always come forth to meet us; and with few exceptions even to the age of 106 years were found hale, if not vigorous in mind and body, much interesting information being gotten from parties 80 and 90 years old, with memories as fresh apparently, and minds as clear as they ever had been, men even of that age tak-

ing their share in almost hard work. Although this is a double testimony in its favor, it is as impossible, nevertheless to deny, as it is painful to acknowledge, that hitherto, these coasts have proved most fatal to Europeans, that sailors, soldiers, and civilians, have alike fallen victims to its fever, and on Chedooba an ample share; nor may there be a doubt thrown on the attention and ability of those medical officers whose exertions have yet hitherto failed in all attempts to stop its fatal progress. Whether therefore this country is one from which the European is to be ever thus excluded, or whether in the progress of all other improvements, and also if the character of his treatment by himself or by others may be found hereafter to enable him to make here also his temporary home, and introduce, with his wealth, his intelligence, his energy, and above all his religion, their attendant blessings, must apparently be left for the future to shew. But giving to the facts, which constitute this favorable evidence, no more than the weight, they are strictly entitled to—and others may be found perhaps to entertain with me, even more than the hope, that some such improvement may eventually render the climate of Chedooba, and also that of Arracan, no longer so fatal a bar as hitherto, to the advance in these provinces of the Civilization of Europe.

(To be continued.)

Memoranda on the 'Chulchulheera' of the Hills, and on some Lichens from the Himalayas in the Collection of the Asiatic Society.

By HENRY PIDDINGTON, *Offg. Curator, Mus. Asiatic Society.*

My attention having been directed to this subject by our President, I took the opportunity, when examining the 'Chulchulheera,' to test also some lichens sent to the Asiatic Society from Simlah, in 1838, by Mrs. Siddons, which I found in the Museum. I have thought it worth while to make known the results of my work, and to add a few remarks which have occurred to me, in the hope of drawing attention to this very interesting though neglected subject.

I subjected the 'Chulchulheera' to the common ammoniacal test, and found that it yielded a tolerably bright red brown liquid, though not the violet red described by Hellot; I did not succeed in producing any substantive dye with it, though using several mordants, I essayed to manufacture some kind of Cudbear from it also, but did not succeed. The preparation of Cudbear however depends upon two

fermenting processes, the first of which is the preparation of fermented urine, and then a sort of fermentation of the lichen with the prepared urine and lime. I am very doubtful whether, at the temperature usually prevailing here, we can obtain the fermented urine at all, in the state in which it is used in Europe, from its passing so rapidly to the incipient putrid state. It may moreover be doubted whether the heat is not also too great for the fermentation of the lichen. Hence, and because all fermentative processes depend so much on heat, and often on the quantity of material used, nothing can be predicted of this failure.

Lichens from the Himalaya.

These are, as above stated, a box sent down by Mrs. Siddons in 1838. I have arranged herewith a box of specimens of them, and one of bottles of the liquids produced. I subjoin a note of the colours as they appear when fresh, and I have marked their differences when seen by transmitted or by reflected light, for this appears worth noticing. To be seen properly they must be examined in a bright sunshine. I observe that some of the colours change a little, or become duller, in a few days.

<i>Nos.</i>	<i>By transmitted Light.</i>	<i>By reflected Light.</i>
1.	Crimson red.....	Lighted and duller.
2.	Rich bright Crimson.....	Deeper but very brilliant.
3.	Thin, poor, white-wine colour .	The same
4.	Deep maroon brown	A fine clove, or red brown.
5.	Dull red.....	The same.
6.	Very rich port-wine red.....	The same.
7.	Bright white-wine colour, but thin.....	} Duller.
8.	Crimson brown	
9.	Orange crimson	The same.
10.	Crimson	Crimson brown.
11.	Deep crimson.....	Brown.
12.	Deep crimson	Bright red.
13, 14, 15; much like No. 7, but I had but very small quantities to use for testing :—		
16.	A poor dirty orange brown....	The same.
17.	A brilliant crimson.....	The same.
18.	A golden brown.....	Clove brown.

I should think, from the richness and intensity of the colours, that most of these, excepting perhaps, Nos. 3, 7, 5, 13, 14, 15 and 16 are worth attention; and it should not be forgotten that they have been certainly

three, and perhaps four years since they were collected. I proceed now to set down such remarks as occur to me.

There must be in all countries a season at which lichens and mosses, like all other vegetable productions, possess the largest quantities of colouring matter. At what time this occurs for Indian lichens, we at present know not: for those of the Himalayas' it is probably the autumn, and in other parts the driest seasons.

Judging from the under surfaces, some of these which I have tested are tree, and others rock-lichens; but there must be great numbers more of both kinds in those extensive regions. The rock lichens of cold countries are usually the best, as far as our knowledge yet goes.

We know nothing hitherto of the forest-mosses and lichens of the vast jungles of India, from Assam to Goandwana, and from the Terai of Nepaul to the Sunderbunds, the forests of the Southern Ghats, and those of Ceylon, Arracan, and Tenasserim! It is true that it is, as yet, supposed that the lichens of hot and humid climates are little productive of colouring matters; but I know not on what this notion is founded. There would seem to be as many probabilities the other way.

And when all the lichens, above alluded to, are examined, we have other vast fields and these of great promise. I mean the great volcanic plateau of Central India, from the basaltic rocks of Bundelcund to the Toombuddra; the points where, as at Vizagapatam and Cape Comorin, the granite meets the sea; those where, as in some parts of Malabar, the trap rocks from the coast; and the whole of the range of coast and islands, of every formation, which form the eastern shores of the Bay. We may in fact, from the infinitely varied condition of climate, rock, and soil, which I can only hint at here, except every possible variety of moss and lichen; and that many of these must be new and valuable.

Provided a lichen yields a strong and bright colour, we may always hope that it may be turned to account. It will be noted, that all these, which I have now examined, give colours which lie on the yellow side of the red, and not on the blue side of it, which would produce the violets. I mention this, because there seems a notion abroad, that only those which yield at once the violet-reds to the ammoniacal test are of any value. In the instructions for Capt. Beechey, on his voyage to the Straits of Magellan, this is indeed pretty nearly said in direct words. Now we know that, from Lapland to the Mediteranean, the rocks of Europe have been pretty nearly stripped of their lichens, by agents sent out from the great silk and cotton-printing establishments, for much of the work of which the rich Canary lichens are unsuitable, and far too dear. We may

hope to find some equal to, or indetical with these, but we may be well content with the goodly supply of the secondary sorts, with our great extent of territory must insure us when they are known. In no trade is there so much competition and so many secrets as in the dying and printing of silks and cottons; and I take it that none of the published notices give any distinct idea of any thing, as to the value and kinds of lichens, beyond what is already well known in the business: the secrets are far too valuable to be given away. The colouring principle moreover is not the only part of the lichens to be turned to account, gummy matter, extracted from them by Lord Dundonald's process, supplies the place of the costly gums in many printing processes.

There is an omission in all the printed notices which I have yet seen, which in many cases might mislead persons testing lichens. An important process—that of crushing or even pounding the moss or lichen to powder—is wholly omitted? A chemist would of course think of this; and Hellot, the inventor of the ammoniacal test, from whose writings all have subsequently copied, mentions it; but the usual directions lead people to suppose that the lichen is merely to be broken to pieces and infused, which may often be insufficient to develop the colour properly, and thus lead to a wrong conclusion.

The single lichen *Rocella* has been a mine of wealth to the Canaries and Cape de Verd islands. We have at least a fair chance that India may produce one, if not more, of these productions of a valuable kind, but nothing can be properly ascertained on the subject unless a considerable quantity—say a maund or two of each promising sort—be sent home. In the hands of European dyers and chemists, with their extensive resources, great experience, and ample leisure, it is quite possible that results may be obtained, which, our petty means, and want of experience and leisure, are quite unequal to develop. I have, for example, strong reason to believe that some of these lichens contain the 'Erythrine,' or violet-red principle of Heeren and Nees Von Esenbeck; but the research is one of those in speculative chemistry, which I have neither means nor time to undertake. I shall nevertheless be happy at all times to contribute my mite of aid, whenever it can be useful in the search for good dying lichens.

On the Topes of Darounta, and Caves of Bahrabad.—BY THE LATE
LIEUT. PIGOU, (*Engineers.*)

At a distance of six miles from Jullalabad in an easterly direction is situated the village of Darounta, at the foot of the Koh-i-Surrukh on the right bank of the Jullalabad river; scattered through the village, and in its environs are eleven topes, of various sizes, but all much smaller than the tope of Manikyala; on some of these are evidences of their having once borne external ornaments similar to those found on that tope; they are built of stone and slate, cemented with mortar, and in some cases merely with mud; all of them possess a chamber from 4 to 8 feet square, and some of them have in addition a shaft running down the centre; at the time of my visiting them, six of the largest had already been opened by Messrs. Masson and Honigberger; in opening the others, the method pursued was, to cut, as it were, a slice from the lip to the bottom, reaching to the centre by this means both the central shaft, and the chamber at the bottom were laid open; out of the four thus opened, one was empty, the contents of the other three were as follows:

Box No. 1, was taken from the Tope-i-kutchera; it was found in a chamber about six feet below the level of the ground; it was contained in a rough case made of four slates (about a foot square) stuck together with clay; these fell aside on being touched. Within the box were the three coins, and a peice of rock crystal; the coins belong (2) to Ermæus III. (?) and one to Azos,

Box No. 2, was found in the Tope-i-fasl, it contained a small gold box, in which were placed several pearls, with holes drilled through the centre, and some small peices of what appeared to be bone; the gold box with its contents has been stolen from me.

Box No. 3, was found in the Tope-i-Hosen-amanat, covered in a manner similar to Box No. 1, it contained a mixture of light red earth, and grey ashes, and three coins, all of Azos.

There can be little doubt but that these topes were built in memory of the illustrious dead; without reasoning from analogy founded on the statements of a late traveller in the crimea, regarding the sepulchral tumuli discovered in the vicinity of the ancient Panticapeum, the metropolis of the famous Mithridates Entapor, the evidence furnished by the relics found in the topes, would irresistibly lead to such a conclusion; with regard to the æra when these topes were constructed, it is more diffi-

cult to give a rational conjecture, but it is at least worthy of remark, that more of the coins formed in them, are of later date than the Bactrian kings.

Opposite to the village of Darounta, and overhanging the left bank of the Jullalabad river, are the caves of Bahrabad;—these have been excavated on the plan of a town, but on a smaller scale, there is a charson or meeting of four roads; that running to the north is the longest, and from it, five chambers open, these receive light from apertures immediately overhanging the river, which runs about 100 feet below them; the passage running to the south leads to a Dallán or Hall, which also opens over the river, the passage to the west leads to the river, while that to the east is the general instance to the whole plan. The chambers are all lofty, airy, and well lighted, but the passages are very low and narrow. The cave mentioned by Honigberger as the Fil-khana, is a little to the east, and separated from the principal set of caves. The only antiquity discovered in them, was a small slab of rough reddish marble, about 5 inches square; on this slab was executed in demi-relievo, a pair of human feet, the toes, &c. being all distinctly marked; round the feet, are four Lotuses, one at each angle of the slab executed in bas-relievo. It is said that similar slabs have been found in Ceylon, if so, a presumption may be drawn, that if the caves of Bahrabad do not owe their origin to the Buddhists, they were at least at one time inhabited by them.

R. P.

NOTE.—The objects given in the annexed plate were presented to the Asiatic Society, with the above memoir by the late Lt. Pigou of the Engineers, through our late V. P. Col. Macleod, in his letter to whom Lt. Pigou writes as follows of the gold box (unfortunately lost,) which was the most valuable in all respects of the remains discovered at Darounta.

‘I have the pleasure herewith to forward two boxes, and some coins taken from the Jullalabad topes; the three boxes, I had previously promised to Dr. Athinem to whom it is now made over, it was similar in shape to the box No. 1, but not quite so large. I regret that the small gold box, with its contents, has been stolen, as it was the greatest curiosity of all, but the precious metal excited the cupidity of my servants, who have made away with it. The marble slab is too heavy to send down by dák, and I have not got it with me; indeed I am not sure that it has not been lost, but it is possible that it may have been left in my hut at Jullalabad. I also send you a rough sketch of the Bahrabad caves, which will give

an idea of the place, I am sorry I have not time to make a more elaborate drawing, but must forward it rough, just as it was sketched."

*The death of the writer of the above, by the premature explosion of a fuse, which he had with equal coolness, and gallantry laid to the gate of a fort in the Bajowur territory, during the recent employment there of Col. Shelton's brigade, has destroyed all hope of the recovery of even the slab. The presence on it, however, of the most unequivocal of Boodhist emblems, obviates all doubt as to the nature of the caves, were there not ample reason for coming to the same conclusion on other grounds. I alluded (*As. Soc. Journ.* No. 109, p. 97) to the Darounta and Bahrabad discoveries, with reference to those recently made at Kanari by Dr. Bird; the caves of Kanari we know, from the most authentic sources (*Travels of the "Chinese Boodhist Priest Ea—Hian."* A. D. 399. M. Remusat's Translation) to have been a favorite place of Boodhist pilgrimage; the Boodhist character of those at Bahrabad, is proved by the presence in them of emblem peculiar to *Boodh*; the topes at Kanari yield an inscribed plate which records the dedication of the place 'in honor of the most powerful, very wise, and superior *Bhagavana Sakya Muni*,' while 'copper urns, a ruby, a pearl, small pieces of gold, and a small gold box, a silver box, and some ashes' were also found there: at Bahrabad no inscription is discovered, but 'the copper coins, and the rock crystal' (types of the wealth of a poorer people) the 'small gold box in which were placed several pearls with holes drilled through the centre, and some small pieces of what appeared to be bone,' all go to prove that the races, which at points so far apart, have left these traces of their usages, and their religion were equally Boodhist; although the constructors of the Darounta tope would appear to be the ruder, and less wealthy of the two. They are able it is true to deposit gold, but more sparingly; ruby is replaced by common crystal; a stone vase, is used in place of the copper urn, and copper coins supply the bullion of the Kanari tope. The mausolea are evidently those of persons of inferior means, although in the character, and nature of the deposits, we trace an intimate connection with the more gorgeous relics of Manikyala. Mr. Piddington has obliged me, with the following notice of the Darounta vases, and their contents.

'Both the vases are turned out of a fine-grained potstone, and have the marks of the tool (particularly inside) as fresh upon them as if

* Three of my correspondents and contributors in Afghanistan, and among them, not the least valued, Captain E. Conolly, P. B., Lord and Lt. Pigou, were killed in action within the short space of 8 months.

made yesterday! The larger one has, beneath its foot, the oblong mortise by which it was secured on the lathe. Their dimensions are as follows:

	Height, Inches.	Greatest exterior diameter, Ins.	Thickness, about Ins.
No. 1, Large Vase.....	3·0	3·2	0·4
Small Vase.....	0·9	1·45	0·2

The state of the coins is curious: three of them, Nos. 4, 5, and 6 of the drawing, are completely encrusted with crystalised carbonate of copper, with a few detached scales of a whitish oxide, which may be owing to an arsenical or zinc alloy in the copper? or to carbonate of lime having penetrated to the coins? though this last seems nearly impossible; they are in very minute quantity, and it would not be worth while to disfigure the relics by picking any off for examination.

The remaining three coins Nos. 1, 2, 3, are marked as having been 'found in the box,' and they look so clean that we are inclined to suppose they have been really cleaned; especially, as the metal is much eaten and worn. No. 2, has still traces of the carbonate of copper on its face. No. 3, is the only one which we can suspect of having undergone the action of fire, but the boxes bear no trace of this, and I am inclined to think, that they have not been subjected to it. The rock-crystal ornament requires no particular remark,—beyond, I may add, the peculiar trouble, which has been taken in perforating it; it resembles exactly in size, form, and mode of perforation, the uncut emerald, now universally worn, by native chiefs and gentlemen of rank. appended like a drop to the *surpéché*, or head jewel. The people who could have bestowed so much labour upon so common an object, must have been singularly ignorant of the more precious stones, and I might point to this slight index, as affording some proof that the deposit at Darounta, was made by the first leaders of a new race of conquerors, who subsequently left monuments of their rule, then a more polished, and a wealthier people, in the noble works at Manikyala. There too (*As. Soc. Jour.*, vol. III. p. 563) we see, as on a smaller scale at Kanari, the practice of placing inscriptions in the tope obtained, showing perhaps the progress of science in conjunction with that of wealth.

An examination of the coins before us will lead to the ascertainment, with tolerable accuracy, of the date at which the Darounta Topes were constructed. The coins are, No. 1 of Azes: No. 2 is similar to No. 12 (*As. Soc. Jour.* Vol. III. Pl. XXXIII.) of those found in the Manikyalan

Tope by Mons. Court, in so far at least as the figure and attitude of Hercules is concerned; the head on the obverse of the coin is too indistinct to admit of very accurate identification, but I am convinced that the two are similar; Mr. James Prinsep remarked on the difference obtaining between this coin, and the rest of those found with it at Manikyala, and (As. Soc. Jour. Vol. VII. p. 646) he afterwards observes of this coin; 'on the reverse of the coins of the second Hermaios (or perhaps the third) having a Hercules for the reverse, commences another series of native names following what we have designated the Kadphises, or Kadaphes Group.' It is in fact a coin of Kadaphes, who invading, and subduing the country of the last Hermaios, adopted in part, according to the wont of the barbarians, the effigy of his coins, affording a strong contrast in its classicity, when placed, as at Manikyala, in juxtaposition with the peculiar coinage of the Kadphesis and Kanerkis, by whom the types of Grecian domination were foregone. The presence at Darounta of this coin, (or coins, for No. 3 seems to be a duplicate though indistinct) with those of Azes, goes directly to support the truth of Professor Lassen's Chronological Deductions as respects that King, and his immediate predecessor. 'The coins of Azes,' he observes, 'are so closely connected with Greek types, that he must undoubtedly be a proximate successor of the Greek Kings, * * * * *: he must be considered as a cotemporary of Hermaios.' (Lassen on Bactrian History, As. Soc. Jour. Vol. IX. p. 662.) But Mr. James Prinsep connects Kadaphes with Hermaios; when therefore we find their coins together, as in the instance now before us, the advent of the Saces under Kadaphes, to the destruction of the remains Græco-Bactrian power, and the succession of Azes shortly afterwards, (who founded the great empire of that people) may the more readily be admitted. Professor Lassen gives the following dates, about which we may assign the period of the construction of the Darounta Tope.

The Græcian Empire of Hermaios subdued by Kadaphes about	120 B. C.
Great Empire of the Saces, under Azes about.....	116 B. C.
Azilises succeeds him about.....	90 B. C.

I need hardly add that to *Kadhpises* (a Parthian) Professor Lassen assigns a reign about 100. A. D. subsequent to the expulsion by Vikramaditya of Malwa of the Saces, from the countries along the Indus, A. D. 56, and a re-invasion of the land by new hordes of conquerors.

The coin No. 4 is so much disfigured by oxidation, that the artist, who, in the plate before us, tried for the first time the difficult task of delineating on paper the semi-defaced design of a coin utterly new to him, has

been a little misled. It is simply, like Nos. 5 and 6, the ordinary mounted horseman with outstretched arm to the left, and fillets depending from the head. The only coin in tolerable preservation is No. 1.



Report on Productions and Manufactures in the district of Hunumkoondah, in the dominion of H. H. the Nizam of Hyderabad. BY A. M. WALKER ESQ. M. D., Assistant Surgeon. Communicated from the Political Secretariat, Government of India.

On the 12th instant, I had the honor of reporting my arrival at Hunumkoondah, since that time I have been employed in observing and noting the most important facts in reference to the object for which I am employed, and particularly in making inquiries respecting the production and manufactures in this part of the Nizam's dominions. As far as I could, I have trusted little to mere oral information, but have endeavoured to authenticate by actual observation, whatever appeared to me interesting or useful in nature or in art.

The face of the country in this neighbourhood presents a striking similarity to that in the vicinity of Hyderabad. Here are the same rounded, dark colored, herbless eminences, solitary, or in groups of considerable range, rising to the height of three or four hundred feet with the same ruinous appearance of the lower hills, and the fantastic piling of one boulder of rock on another.

The tank, with its mound of earth or masonry and the sheet of verdure which it nourishes and maintains, serve to complete the resemblance of general form and outline, nor does a more minute examination detect many discrepancies. The surface rock, throughout, is granite, usually of a greyish colour, but varying from a dingey white to a reddish and more rarely to a blackish hue, according to the colour and predominance of each of its constituent parts, quartz, felspar and hornblende. Where quartz is prevalent, the rock is close grained and compact, with little tendency to wear, while on the other hand the most superficial examination will shew that the excess of the two last, and more particularly of the felspar, is the certain cause of decay.

In one locality in the village of Nagwazum, five miles to the north of this, so abundant is the homblende and felspar, to the exclusion of quartz in several specimens of the rocks, that they might be called sienitic

greenstone. I have nowhere seen mica take the place of the hornblende, hence the whole formation might be more properly termed sienitic than granite, particularly if the latter term is to be restricted to a determinate compound. Sienitic granite, however, a compromise between the two, would appear the better and most intelligible term for the rock as it exists here.

In a spur of hills running north south near the vilage, of Erappully ten miles to the west of Hunumkoondah, I remarked that the granite becomes stratified or in other words passes into gneiss.

At the foot of these hills the iron ore, afterwards to be described, is found.

I have not met with lime-stone yet, but from its being very commonly employed by the natives, I should suppose that it existed in considerable quantity. From their account it would appear to form nests in the granite; the soil is of four descriptions, first the Chilka, a red gritty soil little fitted, from the coarseness of its particles, for the purpose of agriculture.

2nd. Lalzumeen, a soil also of a reddish hue, and evidently the former in a more comminuted state; this is put beyond doubt by the ant hills formed on the Chilka soil being composed of this earth.

We thus see that these insects, usually looked on as troublesome and destructive pests, are not without their use in a grand natural operation. The peculiar acid, the formic, which is their chief agent, acts on the alkali and lime and most probably on the silica of the rockdebris, pulverizing it, and facilitating in all probability fresh combinations; the soil when manured is fitted for the reception of all kinds of crops without reference to season.

3rd. The Regur soil. As far as I have yet observed, this soil is of less frequent occurrence than the two last mentioned; as elsewhere it is particularly adapted for cotton cultivation, and is generally esteemed the richest of soils. It requires little or no manure: yet the ryots are in the habit, previous to cropping, to let sheep loose upon it, it being supposed that their urine is very advantageous to its fertility: this is exceedingly probable as the salts which the urine contains, and the compounds they form, must be very efficacious in loosening the soil, and preventing the formation of clods, the common drawback of argillaceous soils.

4th. The Talao-ka-jumeen. The black soil found in the bottom of tanks. This is little esteemed, being a stiff clay, little permeable by moisture; it abounds in fresh water shells and at the beginning of the dry season, its surface is incrustated with carbonate of soda, of which mineral large quantities are collected for soap making. A property, common to all

these soils. is, that they effervesce with acids, thereby indicating the presence of carbonate of lime.

As far as our geological knowledge can lead us, the presumption is, that these soils in all their varieties are nothing more than the decomposed sienitic rock, and considering the number of simple bodies, of which this is composed, viz. Oxygen, Silica, Aluminium, Calcium, Potassium, Sodium Iron, and perhaps Manganese, and the ever varying proportions of its more immediate ingredients, we cannot wonder at, although we may fail to explain their striking diversity. Our notions of what may be termed the chemistry of nature are yet very vague and unsatisfactory, for an appeal to the crucible, electrophorus, and the whole machinery and reagents of the laboratory, has not always been successful in elucidating natural phenomena strictly chemical. Let us rest on the negative evidence of the impossibility of discovering, with our present lights, any other source for these soils than the rocks subjacent or in their vicinity, until strong proofs be afforded of their origin elsewhere. We cannot class among these the opinion, well nigh become an axiom with certain Indian naturalists, that the Regur, soil is always due to the disintegration of basalt; as for this purpose we must bring the Kishna or Godavery over heights and ravines, that existed periods of time anterior to a secondary trap rock being thrown up.

When the ground is left uncultivated, even for the short space of a year or two, it never fails to be covered with a low jungle, composed chiefly of the *Cassia auriculata* and *Zizyphus microphylla*, the former plant is hardy and luxuriant, and is in every respect the peculiar enemy of the cultivator, who certainly does not take the most effectual means to rid his fields of it, contenting himself with burning it or cutting it down to the level of the soil instead of rooting it up. Of the jungle trees by far the most common is the *Butea frondosa*, now in full blossom, which with the *Bombax heptaphyllum*, and the *Erythrina Indica* stand out as the most garish of the forest trees. The *Garuga pinnata*, *Hyperanthera Moringa*, *Cassia fistula*, *Annona reticulata*, *Melia Azedirachta*, *Bauhinia parviflora*, *Capparis trifoliata*, *Ficus Indica*, *Ficus religiosa*, *Bombax gossipinum*, a species with yellow flowers, *Feronia Elephantum*, with four or five species of *Acacia* make up the list of the more common jungle trees. The *Borassus flabelliformis*, (the Palengra tree) is every where seen, which with the *Phoenix sylvestris*, also common, yields in great abundance the well known Toddy. Of the common jungle creepers two or three species of *Asclepias*, and *Capparis*, and the *Combretum rotundifolium*, are at this season, the most conspicuous.

The Mango and Tamarind trees are common about villages.

The grain chiefly cultivated is rice, of which no fewer than eight varieties are sown. Of these the *beetee wadroo* is the most cultivated, being both a rain and a dry weather crop, it is a middle sized grain with a husk of a light brown colour; two of the other kinds are much smaller grains with white husks, the other five differ in size, colour of husks, &c.

Little of the rice raised is consumed by the inhabitants, but sent to Hydrabad forming the principal export; in the districts its consumption is limited to the richer Mahomedans, Hindoo Zemindars, Brahmins, &c.; the poorer classes chiefly derive their subsistence from the rain or *punass* crops.

The principal *punass* or khureef crops, are as follows:—of grains, Andropogon Sorghum (two varieties of jooarry, red and white; the first only properly a punass crop, Andropogon Sacharatum), Bajree, Paspalum scrobiculatum; Triticum wheat, a red sort sparingly cultivated; Panicum Italicum, Italian millet; Cynosurus Corocanus (Raggy), and Zea Mays. Of oil plants, Sesamum orientale, black and white, Ricinus communis, two kinds.

Of Legumes, Dolichos Lablab, Dolichos gladiatus, Dolichos fabæformis, Phaseolus mungo, Hibiscus cannabinus (Umbarah), a hemp plant, (leaves used by the natives as greens) and a variety of cotton called Salkapas. The rubbee crop consists of white jowarree, Cicer arietinum, Phaseolus mungo (a black variety), Crotolaria juncea (the sunn plant), and cotton, sugar, and paun. Piper betel is also cultivated to a limited extent, and also tobacco of an inferior quality. It is remarked that tobacco irrigated from a well of brackish water is superior in flavor to that irrigated from sweet water.

This can be easily understood, as a common means with fraudulent tobaccoists of heightening the flavor of their tobacco is by dipping it in a saline solution. The garden produce consists of red pepper, brinjals, onions, garlic, carrots, radish, sweet potatoes, dill, coriander and bishop's-weed seeds, mustard seed for oil, fenugreek and some speices of amaranthus for greens, they use also the flowers of the *aeschynomone grandiflora* as a potherb.

Melons, cucumbers, and gourds, as in other parts of India, form a considerable article of diet, particularly in the dry season.

The village cattle are small, and at this season of the year far from well flavoured, but is said that a stout breed of bullocks is not to be met

with in the neighbourhood. Flocks of sheep, black and white, are every where seen.

The breed of horses, small, ill-shaped ponies, is very indifferent.

Wool meets a ready market in the districts being brought up for the carpet weaving of Warungal, and the manufacture of Kumlees; a small quantity is sent to Chandah in the Nagpore territory, its price at present is nine seers (the seer of 82 Halle Siccas) a rupee, white wool is 25 per cent. more valuable than black.

Hides were formerly exported, their price varies from twelve annas to (2) two rupees each. The ceasing of the export of hides within the last few years, is a favourable index of the extension of agriculture, as leather is employed in a certain quantity in almost every implement of farming.

The iron ore is found at the foot of a range of hills running N. and S. about ten miles to the west of Hunumkoonda.

It exists in the form of fragments, often of a rhomboidal shape imbedded in a red clay, and accompanied by pieces of gneiss and quartz. It is evident that the neighbouring hill is the source from whence it is derived, and I have little doubt that a skilful miner with some trouble (for the gneiss hill, unlike the granite, is clad with a pretty deep alluvion) might come upon the original bed of ore, of which these are mere detached portions; as it is, the demand for metal is sufficiently met by collecting and smelting these fragments. It is said that the Iron tract occupies a space of ten begahs, the greater part of which is covered by a woody jungle. The shafts are of various depths from 10 to 30 feet; into these the miner descends, and detaches by means of a small pickaxe whatever mineral he meets with from the red clay containing them, he determines by their weight whether they contain ore or not, and thus fills his basket. He can gather during the day six or eight small baskets full, one hundred and twenty of which are sold to the smelter for a rupee. The ore is reduced in the adjacent villages in the usual rude way so well known. It occupies six men for two days to turn out a maund (12 seers) of metal.

The Iron is brought up by Bunyas, for exportation, for R. $1\frac{1}{2}$ a maund, and is sold to other customers for two or three annas more. The ore is of that kind usually called magnetic iron ore, and black iron ore being a compound of protoxide and peroxide of iron; it possesses the magnetic power but slightly. I have made a number of trials, and have found no specimen with magnetism enough to pick up a small needle. The circumstance too of the cutlers here having in their possession pieces of magnetic iron ore, as heir looms and talismans, sufficiently prove that this

virtue in a high degree must be rare indeed. The Sp. gr. ranges from 4.3 to 4.8, which would give nearly an average of 4.5. From this I am inclined to think, that malgre the deficiency of attractive power, the ore is a tolerable rich one; I may add that of all iron ores the black is the richest; by possessing it Sweden is still able to surpass great Britain in the manufacture of the metal.

Besides the *morinda citrifolia* the wool dye, which is cultivated on the regur soil, the *Oldenlandia umbellata* (Cherwell or chay root) grows wild here in great plenty. A man and his wife can easily gather forty bundles in a day, which they sell to the dyer for 4 annas; it is employed to dye cotton of a red and orange colour. The *Oldenlandia* is cultivated on the Coromandel Coast. It is very probable that the dying properties of the wild, excel that of the cultivated, for dyes often follow the same law which renders the smell and taste of the wild plant, growing in a state of nature, stronger than those carefully attended.

The dying process is very tedious, occupying forty days and upwards. Five or six pieces of *Indigofera* are met with here, but one species only, the *Indigofera cærulea*, is used for the preparation of Indigo. It is collected in the rains when the dye is commonly made, the method of preparing which is sufficiently simple. A strong decoction is made of the plant, leaves, flowers, pods and twigs, being all indiscriminately thrust into a gurrah; when this is hot an infusion of *Eugenia jambolana* (rose apple tree) the indigo is immediately precipitated and the superincumbent water being drawn off, is dried in the sun.

The native plan of mounting the indigo vat merits attention: a potash ley is prepared from the ashes of the *Euphorbia Tirucalli* (milk bush hedge) and lime ley, mixing them together and then filtering. In this ley seeds of the *Trigonella fanum-grecum* and *Cassia Tora* are boiled, and the liquor being strained, is poured into the water drawn off, after the precipitation of the Indigo, and the Indigo itself is then put in and some more potash ley is added.

In three or four hours the fermentation is perfected, and the vat fitted for the purposes of the dyer. The theory of this vat is very obvious, extractive matter derived from the liquor in which the Indigo was first boiled, with the sugar, starch, and mucilage, of the two leguminous seeds, cause a fermentation by which the Indigo is rendered soluble in the alkaline solution.

The process is more simple than that usually followed by dyers in Europe, and is in perfect accordance with every rule of practical chemis-

try. There is no superfluity, and no waste; and on the whole it is a most favorable specimen of native ingenuity and skill.

Indigo from Masulipatam, the produce of Bengal, finds its way to this place, and is sold for the same price as the Indigo manufactured here.

The carpet manufacture for which Warungal or rather the villages, Muswarrah, &c., in its close vicinity are celebrated, does not appear to be an indigenous art.

A distinct tradition exists of its introduction, and also the method of preparing and drying the materials that compose it, being due to the Mahometans, facts countenanced, if not substantiated, by the present weavers and dyers being uniformly of that religious persuasion.

The carpet loom is nothing more than the common native loom placed vertically instead of horizontally. The waft is of thick strong cotton twist, being arranged by no wafting mill, but by one of the workmen going round and round two stakes fixed in the ground and dropping the thread at each, as he passes; in the loom it is kept on the stretch by two strong billets of wood, the threads being approached by separate loops of cotton fixed to a bamboo, which is elevated or depressed at the will of the weaver. The worsted is held in the left hand, and a crescent shaped knife in the right, the fingers of both being left free; the inner thread of the waft is then seized, the worsted wound round the outer, crossed on itself, and the extremity drawn out, by which it is made to descend in the form of an open figure of eight to be snipped by the curved knife. It is superfluous to say that this is the work of an instant; when the pattern is new or difficult, the order and position of the worsted threads is changed by a coryphoeus in a kind of rhyme. On a row being completed, the warp, in the shape of a cotton thread dyed dark brown by the bark of the *Swietenia Febrifuga*, is forced down by means of an iron toothed comb, in form something like an adze; the whole is completed by cutting the worsted to its proper length by a large scissors held steadily against the waft. It would rejoice a Manchester or Glasgow manufacturer to learn that infant labour is employed and preferred in Warungal carpet weaving, it being averred that their more limber finger joints are best fitted for the finer parts of the work, but cupidity all over the world is ingenious in finding excuses, and is ever ready to con-found the expedient with the right. Dried springs of Toolsee (*ocymum sanctum*) and bunches of *Lepidigathis Indica* are attached to the loom frames; the workmen say that they make their labour go on more cleverly. Twelve different worsteds are employed.

The blue is produced from Indigo, the yellow, the sulphur yellow, from boiling the sulphur yellow in water impregnated with carbonate of soda, in which a little turmeric has been mixed, the deepest yellow is produced by dipping the same in potash ley. The reds are all produced by lac dye dissolved by tamarind juice, with sulphate of alumina and potash as a mordant. The depth of colour depends in 3 cases upon the original black, brown, or white colour of the wool; in the fourth on the length of time the last description of wool was allowed to remain in the dye. The greens are produced by immersion in Indigo, and then in polas or turmeric, their degrees also depend on the original colour of the wool. Bengal Indigo is always preferred to the home-manufactured by the worsted dyers, cotton carpeting is also prepared in the same way as the woollen.

The carpet weavers are described as given up to indolence and dissipation, to both of which they appeared on a late occasion most anxious to minister by endeavouring to establish a monopoly. There are at present two hundred looms working; at the village of Hoosun-purti, five miles from this, a good many looms are employed in weaving tusser or jungle silk. As this letter is already too long I shall defer till another occasion the description of this manufacture, and the rearing of the insects producing the raw material. I cannot conclude this without mentioning an import to this place, viz. English cotton yarn, of an orange colour, which comes from Masulipatam to be used by the cotton weavers in the borders of saries, punchees, &c.; the reason they assign for its employment is the quick fading of their native yellows; in all probability the English thread is dyed with fustic wood (*Morus Tinctoria*) the most lasting of yellow dyes. Be this as it may, its use bodes ought but good to the Indian manufacturer.

Roree in Khyrpoor; its Population and Manufactures.—By
CAPTAIN G.E. WESTMACOTT, 37th Regiment, Bengal N. I.

Roree or more correctly Lohuree, the ancient Lohurkot, is a town of considerable antiquity, and said to have been founded with Bukur, about the middle of the 7th century of the Hejira. It is built on a steep limestone ridge that sweeps in a crescent form along the east bank of the Indus. The strata of the rock is horizontal, and exhibits marks everywhere of the the action of the river, which must have risen formerly at least fifty feet above its present level in the season of floods, and washed the foundation of the houses. In the sandy bays, creeks, and hollows aban-

doned by the stream, date and peepul trees grow luxuriantly, and rocks worn by the water, and shattered and broken into gigantic masses, were submerged at no very remote period. Along the base of the hills, on both banks of the river, the land bears the appearance of having been under water. The remains of a stone and brick wall, or quarry, built evidently to oppose the encroachments of the river, runs along the edge of the precipitous ridge which supports the town, and under it is an extensive cavern. Clay buttresses shore up the houses, which rise to four and five stories, and being composed of frail materials and badly built, threaten momentarily to topple over into the great road leading to the watering place, which is usually thronged with people.

The inhabitants affirm that the periodical rains have failed the last twenty years, and that the river rises less annually. An old Bunneah pointed to a spot, which he recollects to have seen covered by the river, and is now removed at least six feet above its level in the floods. To this cause partly, the people attribute the decline of the prosperity of Sind, and the extortions of the Talpoor Beloochees and the large expense incurred in digging canals and cuts for irrigation, swallow up the entire produce of their industry.

The Bunneah remembers upwards of fifty houses in Roree, being washed down about twenty years since by rain, and I can easily fancy the havoc a storm would make among the frail and ruined tenements in the town. The Indus rose, within his recollection, ten or twelve feet higher than it does now; for the last four years scarcely any rain has fallen, and grain has become progressively dearer, but there was a plentiful supply in 1839, compared with the quantity that fell in the preceding seasons.

The lime ridge behind Roree is without a blade of vegetation, it swells into peaks and eminences, and stretches several miles inland, and along the river, to the south. Some of the hills are isolated,—and intersected by little valleys, and some are capped by tombs, shrines, and other buildings in ruins. These parched and arid hills are in powerful contrast with the deep verdure of date groves and *bajree* fields that are scattered in rich luxuriance over the low grounds towards the capital of the principality. The *ledgah* of Roree is about five hundred feet above the river, and few spots in the Eastern world surpass the view from it in beauty, and present a greater variety of objects. In front of the spectator are two picturesque little islands; the one covered with date palms, the other with tombs and mausolea, shooting up into innumerable pointed spires of glazed porcelain. The fort of Bukur, beyond it, embraces a

vast oval rock in the midst of the Indus, and exhibits on this face twenty-three bastions of different forms resting on the edge of the stream; and date and peepul trees spring from the naked rock, and fix their roots in the foundation of the embattled curtain. On an elevated citadel in the middle of Bukur, floats the small blood-red flag of the Meer of Khyrpoor, emblazoned with the national emblem of a rampant tiger, and near it on a loftier staff, the more gorgeous standard of Britain, fourfold the size of the banner of the Meer; above and below the fort, are small wooded islands, inhabited by holy beggars, who are fed and attended by votaries from both sides of the water. The eye delights to rest on fertile groves of lofty date trees, mixed with vineyards and mango trees, and the Indus is seen meandering, far away in the distance, in snaky folds, through a perfectly flat and verdant country. The heights of Sukhur are a prominent feature in the landscape, and every hill crowned with a tent, a tomb, or a ruin. A battery of seven guns is in the midst of the British camp, and to the west of it the decayed mosque, the sainted shrine and minaret of Meer Masoom. The living objects in the foreground of the picture communicated to it, at the time of my visit, additional interest and animation; an encampment of several hundred camels occupied a small valley leading to the river, and their drivers had tents of black goat and camels hair raised on sticks. Belooch horsemen, with flowing beards, each in his national cap of coloured cotton and accoutred with sword, shield, and matchlocks, rode slowly among the hills, and asses heavily laden with grass and wood for the citizens, wound up the steep rocky ascent into the town. The monotonous song of the washerman filled the air as he beat garments of many colours upon planks, and troops of Hindoo and Moosulman women bathed at the different ghats, each of the former, on her way home, carried a vessel of river water to lave, with pious reverence the roots of a peepul tree, and the emblem of Muhadeva which stood beneath it.

Most of the houses in Roree rise to three and four floors, and some have five, and standing on elevated ground they assume an appearance of great vastness to the eye. They have no ventilators or towers on the roofs, to catch the wind like the houses in Lower Sind and Arabia; but the walls of the upper chambers are pierced with small windows without regard to symmetry. They are not glazed, but some of them in the harems of the principal residents, are filled with fine gratings of wood or mortar; some are open, and others furnished like the doors with folding shutters, which close badly, and are secured on the outside with a hasp and padlock; they are not painted any more than

the doors. The roofs are surrounded by a light rail or ballustrade, and have spouts to carry off water. The upper story has sometimes a wooden balcony, supported on frail posts, and the houses of the rich are contained in a walled court, along with buildings and sheds for servants. The rooms have pannelled ceilings tastefully carved, as are the window-frames and door posts. It forms the only ornament, and there is scarcely any furniture; coarse woollen carpets, and mats, supply the place of tables and chairs; some houses are constructed of burnt brick plastered with clay; when sun-dried bricks are used, they are not laid horizontally, but in a sloping or diagonal direction, (v. Fig. 1,) and the upper walls, which are extremely thin, are any kind of timber placed without regard to regularity, with tamarisk twigs between them, and plastered with clay, and chopped straw. Lime abounds every where; but it is not the custom in Roree nor other parts of Sind to white-wash the outer and inner walls of houses, and they have a dingy uncomfortable appearance. The upright posts are chiefly tamarisk, fixed into horizontal beams of the same, and set in a stone foundation to preserve them from the depredations of white ants. Roofs are flat, and built of slight timbers, covered with reeds, and when reeds are not procurable, mats are substituted. The frame work is acacia, date, a whitish coloured wood called *Bank* or *Buhan*, and any other kind of timber; the acacia is scarce at Roree and Sukhur, and the date never used for door posts and pillars. The people put on the rafters a layer of **teer*, then †*chupree*, and thirdly a kind of reed called *Gondnee* (*Typha*), upon which they spread a coat of fat yellowish clay (*peela muttee*) mixed with chopped straw and the sweepings of houses. Those who can afford it mix wheat chaff with the clay, and when it is dry lay over it a compost of cowdung and clay, to fill up crevices. Dry cowdung is sometimes put on the reeds, and covered with chopped straw and clay; a roof thus formed is about a cubit thick; the wood and reeds occupy eight inches, cowdung the same, and clay two inches. The people assured me, that a roof properly constructed will endure half a century, and resist for twenty years the small quantity of rain which falls in Sind; a roof commonly stands ten years without requiring repairs, but the mats are soon rotted by wet. The cost of building a good shop, of burnt brick on the ground floor in Roree, is 400 or 500 Rs., and double the sum if a story be added to it; a large shop may be constructed of sun-dried

* The upper stem of moonj grass called in India Sirkee.

† The thick part of the stem of moonj grass called in India Surkunda.

brick for 300 Rs., and a small one for 50 or 100 Rs; most of the houses in Roree are calcined brick. To prevent insects penetrating the floors of warehouses, which are intended to receive grain and goods, they are sometimes paved with blocks of stone which may be procured in any quantity in the neighbourhood; the stones are covered with clay, and plastered with cowdung, and a thick coat of coarse salt strewed over it.

Houses above one story, belong to, and are occupied by one family, and when the children marry, they remove to another dwelling; all houses of this description, were built by wealthy merchants and bankers, before the reign of the Talpooras, and through their oppression many have been deserted by the proprietors. Families occupy the lower floors in the cold months, and remove above in summer; they cook and light fires, above and below, and there are no chimnies for the smoke to escape. The great height of the houses, and narrow streets and lanes, exclude the sun's rays, and the heat in the lower stories is quite insupportable to an European in summer. A single narrow door gives admittance to a gloomy and dirty parlour, which is not furnished with windows nor any aperture for light and air; to get at the door you mount an earthen stair with a narrow terrace at top. Poor people rarely use bedsteads,* and have neither pillows nor sheets; they spread their mats at night on the house tops, or terrace in front of their doors, and cover themselves with a blue cotton cloth, which serves them for a garment in the day time. Others lock up their goods in a back chamber, and sleep in their shops, which are open towards the street.

The principal thoroughfare leading up from the Indus is paved with bricks laid edge ways, and some of the lanes and passages in the town, are as narrow and dirty as the closes in the old city of Edinburgh. The bazars are covered in with mats like those of Arabia and Egypt, to keep off the sun's rays, but so much neglected that they are a public nuisance, rather than a comfort, and a horseman cannot ride under them without coming in contact with sticks and cotton straw, which cover him with dust. The interior of houses, is extremely dirty; dunghills fill the open spaces and suburbs of the town, and it presents altogether a scene of great squalidness and filth: here are neither swine, vultures, nor storks to devour the offal as in Indian villages, but loathsome, mangy, and half-starved dogs are numerous, and almost the only scavengers.

* A common bedstead, laced with a string of moonj grass, costs eight or ten annas (12 or 16 pence).

Roree contains about forty mosques, where prayers are recited, and more than double the number ruined and deserted. The great mosque stands on an elevated platform in the N. E. quarter of the town, and was built, according to a Persian inscription on the front, in the year 992 of the Hejira, or 265 years ago, by Futteh Khan Lieutenant of the Emperor Akbur. It is a solid, heavy looking pile of red brick, covered by three domes, and faced with porcelain tiles, and on the east or front face, are a paved court and cloisters, where travellers formerly lodged, but now in ruin. When I entered the court, a traveller was just arrived from a long journey, and stretched at length upon his back on the pavement, while a monjawur, or attendant of the mosque, trampled upon his thighs to give relief, I was told, to his weary limbs.

Near the mosque, in the Hindoo quarter of the town, the *Mose Moo-baruk*, a hair of Mahomed's beard is preserved in a shrine covered with ill painted arabesques. The Sindees say there are only $2\frac{1}{2}$ of these precious hairs to be found in the world; the one at Roree, one at Dilhee, and the remaining half in Persia; the relic, it is believed, was brought to Bukur four generations ago and is enshrined in amber, in a gold case set with rubies and emeralds. The gold case is kept in a golden box, shaped like the pen-holders used by Asiatics, and wrapped in silk, plain and worked, with gold and silver flowers, and again enclosed in a wooden box clamped with silver. The hair is exhibited to pilgrims, and said to change colour like a camelion before their admiring eyes; a number of *Moojawar* or custodians, are attached to the shrine, and four of the principal families receive among them a daily allowance from Government of $1\frac{3}{4}$ rupee.

Roree has two great bazars, one filled exclusively by grain-seller's stores, and the other with shops of cloth merchants, fruiterers, fish-mongers, *et cetera*; people of a trade reside together, and Hindoos occupy quarters of the town distinct from Moosulmans. In the east quarter are the remains of a mosque and serai of noble proportions, which might be restored and made habitable at a moderate outlay, and would be a great benefit to the town, and convenience to travellers, who still lodge under the broken arcades which surround the ample court.

The town contains a number of shops, where turquoises are set and polished, it is a favourite gem but the specimens shown me were small, and of bad colour. People who cannot afford to purchase real stones wear false ones set in rings, and women adorn their toes with blue enamelled buckles or clasps, and their nose with a very unbecoming gold ornament, one half circular, and the other half moulded in form of a

crescent. Silver anklets are common, and females who are too poor to buy ivory bangles wear bone, poverty often prevents their appearing in gay coloured raiment, which is nearly confined to the public women, but they display their fondness for trinkets, by frequent visits to pedlar's shops, where mirrors, combs, leaden rings set with false stones, and other female ornaments, are sold. These shops are crowded with the wives and daughters of tradesmen, who pass much time turning over and trying on baubles, and I observed many sorrowful faces when they relinquished a favourite trinket from inability to pay for it.

In the fish market, a number of women congregate round people who sell *Singharu*, a fish like a shark considered to be very unwholesome eating, but preferred for its cheapness. The fish is cut in pieces, and the women go provided with small bowls to receive any quantity they require for their families.

Roree is divided into 46 Muhullas or quarters, and I add a list, and the description of inhabitants in each, which may be received, I think, as a close approximation to truth.

- 1.—Kanoongo,* Government Officers, Kardars, Moonshees, Putwarees, &c.
- 2.—Wutchooawaree, goldsmiths, &c.
- 3.—Suthdura, M. polishers and setters of stones, silk-weavers.
- 4.—Thushar (the name of a tribe of Moosulmans), M. cotton weavers, agriculturists, &c.
- 5.—Arain Khudwala, M. gardeners and fruiterers.
- 6.—Tukkur (a hill), H. Bahmuns, about 22 families of Hindoo shopkeepers.
- 7.—Musund, name of a tribe of Hindoo Gooroos.
- 8.—Arain (2d) Dulewala, name of a tribe of Moosulmans, M. farmers and agriculturists.
- 9.—Arain (3d) Ootradee, name of a tribe of Moosulmans, M. Farmers and agriculturists.
- 10.—Durgah, M. Moojawars, shopkeepers, cloth sellers, and labourers.
- 11.—Chyn Rae (name of a wealthy Hindoo living), H. shopkeepers and others.
- 12.—Chubootru, H. shopkeepers.
- 13.—Snyud Yakoob Khan Bazar, M. singers and musicians, H. shopkeepers, &c.

* H. denotes that the Muhulla is inhabited by Hindoos and M. by Moosulmans.

- 14.—Gujwanee name of a tribe of Moosulmans.
- 15.—Suyud Jan Shah (name of a Suyud living), inhabited exclusively by Suyuds; they are all Sheeas and permit no other class of people to reside in the Muhulla with them.
- 16.—Suyud Ghoun Sulee Shah (name of a Suyud living), inhabited exclusively by Suyuds.
- 17.—Suyud Ghoolam Shah (name of a Suyud living), inhabited exclusively by Suyuds.
- 18.—Moonda Kube (Moonda name of a deceased Fukeer), M. cotton-spinners, H. shopkeepers and labourers.
- 19.—Kazee Ghoolam Mahomed (name of a Kazee living), M. 15 houses of Hukeems (physicians).
- 20.—Moohur Kundee, M. stone and seal cutters.
- 21.—Kussab, M. butchers.
- 22.—Jiya Shah (name of a deceased Suyud), M. husbandmen.
- 23.—Kazee Pural (name of the chief Kazee of Roree), inhabited by his family and dependents. I may observe that the names of Muhullas which are derived from inhabitants of note are often changed on their decease to that of their successors.
- 24.—Bokharee Shah (name of a *peer* or holy man living), M. mat, fan, and basket makers.
- 25.—Mootrib, M. singers and musicians.
- 26.—Boola (name of a deceased Shuekh, a tailor), M. tailors.
- 27.—Kazee Wudha, inhabited by the family and dependents of Wudha Kazee and Hukeem.
- 28.—Satee, name of a tribe of fish-sellers, Soonee Moosulmans.
- 29.—Puba, name of a tribe of fishermen who float on the Indus on earthen vessels, Soonee Moosulmans.
- 30.—Tukurwala Puba, fishermen, Soonee, Moosulmans.
- 31.—Suyud Gholam Ulee Shah, (name of the Moorshid or spiritual guide of Meer Roostum of Khypoor,) all Suyuds.
- 32.—Bahmun, all Bahmun.
- 33.—Buzzaz, H. cloth sellers.
- 34.—Wudweerhye Kurmoollah, the name of a Shykh of the Wudweehya tribe, in the service of meer Nuseer Khan.
- 35.—Shykh Hydur Ulee, M. Moollas, husbandmen, &c.
- 36.—Churkh durwazee, M. tailors, H. labourers.
- 37.—Dhoora-wala, (from Dhoora a valley. The Muhulla being placed between two hills,) H. shopkeepers and labourers.
- 38.—Moondur, (name of a tribe of Moosulmans) milk-sellers.

39.—Ruseewut, Moosulmans who make string of *wan* or *moonj* grass to lace bedsteads, &c.

40.—Tuwelee, so called because it held formerly many stables. It was inhabited exclusively by Moguls, and devastated by the Tulpooras on their accession. It is now almost deserted being occupied only by about twenty families of Hindoos and Moosulman silk weavers.

41.—Khuchurpoor (name of a tribe of Moosulmans), H. M. coolies, labourers, and poor people.

42.—Mumnanee (name of a tribe of Moosulmans), M. dyers.

43.—Miyanee, inhabited by a tribe of Moosulman boatmen so called.

44.—Peer Bodla, M. shoemakers, leather cutters, and husbandmen.

45.—Mudtur, Moosulman soldiers of the Kuheeree tribe in the service of of Meer Roostum.

46.—Khanpoor, formerly inhabited by Pushans, and now deserted except by three or four Hindoo families.

I ascertained the number of houses to be 2,130, at 5½ inhabitants to a house, which is I think a low average, this will give a population of 11,715 souls.

The shop-taxes (*mulkee*) of Roree, are called twice a year, and each trade nominates a *khulatree* or chief, and pays him a per centage on their profits, to gather the Government dues. The people assert that the Moghul emperors of India did not levy the tax, and that it was introduced by the Kathoras, but this is doubtful. All trades are conducted by Moosulmans; they are ironsmiths, carpenters, shoemakers, leather cutters, tanners, stone-cutters, tailors, dyers, weavers, fishermen, and fishmongers. The Hindoos work in gold and silver and are not prohibited following in other trades, but it is considered a crime by their own people, and those who break the rules are accused of a tendency to Islamism. I took considerable pains to ascertain the amount of tax levied from different trades but am not sure that the following schedule is correct; the tax is subject to alteration, and some shopkeepers who are supported by chiefs and nobles are exempted from the cess.

Cloth merchants (Buzzaz), Rs. 6 per annum.

Cotton cleaners, Rs. 9 per annum.

Weavers of cotton cloth, (Koree)—cutters, polishers, and setters of turquoises and other stones (Weenjurr); barbers and washermen, Rs. 2 per annum.

Venders of brass, copper, and pewter ware, carpenters, slipper makers, and leather cutters, Rs. 4 per annum.

Ironsmiths, each person, 3½ per annum.

Bankers and money changers, Rs. 8 per annum (some of them are exempted from the cess.)

Goldsmiths and jewellers, $1\frac{1}{2}$ Rs. per annum.

Dyers of silk and cotton stuffs (Khombatee), Rs. 5 per annum.

Cleaners and polishers of swords, matchlocks, &c, (Tewura,) Rs. 10 per annum.

Dealers in pedlery (muharee furosh), such as combs, pictures, rings, mirrors, beads, boxes, and glass bangles. Wholesale fishmongers, and steersmen of boats, Rs. 3 per annum.

One distiller (a Hindoo), Rs. 3 per annum.

Tailors and tinkers, $\frac{1}{2}$ Rupee each person per annum.

Ox Butchers, (2 persons) each, 17 Rs. per annum.

Manufacturers of Indigo (2 persons), 18 Rs. per annum.

160 silk looms, 900 Rs per annum.

Fishermen, without reference to the form of their nets and mode of fishing, together 100 Rs. per annum. I have noticed the manner of levying the cess in the Journ. As. Soc., No.

Retail fishmongers, five fish per basket.

Wood cutters, together Rs. 100 per annum.

Goat butchers, together Rs. 95 per annum.

Roree contains seven families of tailors and four of ironsmiths, all of whom deserted their homes in 1839, for the British bazar at Sukhur to escape the shop tax, other tradesmen and artisans threatened to follow their example, and Meer Roostum was obliged to suspend the obnoxious tax, but continues to levy it in Khyrpoor.

There are no brass and copper smiths in the town, nor makers of blankets, canvass sacks and bags, and leather vessels for oil. The two last are made in Khyrpoor and Shikarpoor.

There is one tinner of copper vessels, and four polishers and cleaners of five arms, and a *Kular-khanu*, kept by a Hindoo of the Bhata caste, who distils liquor from dates both dry and fresh.

The number of water bearers (Pancee bhurne-wala) amounts to ten families, and before the arrival of the British they sold *dillas* or earthen vessels, each containing about twenty seers of river water, in Roree, for a copper *pys*. Now they only give seven *dillas*, and earn about four *pys** a day.

* In 1839 the Sohrab rupee was equal to 51 copper *pys* or about two shillings English Currency.

The same individual works as carpenter and bricklayer; a clever fellow earns one *rupee* a day, and an indifferent workman four *anas* and his food, or two *anas* in lieu of food: the common hire is 4, 8, and 10 *anas* a day and food, but those who receive 12 *anas* and 1 *rupee* find their own. These wages equal what is paid in Savoy, where a carpenter or wheelwright has two francs or 1s. 8d. a day. There is no *Nirkh* or price current fixed by the state; every carpenter pay two *pys* of his daily earnings to the *khulatree* or head of his trade, who is chosen for superior ability. The Governor sometimes confirms the appointment, but it is not necessary to render it valid, and the *khulatree* is exempted from the shop tax which is levied on other carpenters; the tax is taken irregularly, and the amount uncertain. The rich and the young generally pay more than the poor and infirm, and the cess varies throughout the country under different Princes and Jalgeerdars.

A labouring carpenter with small business requires the following tools:—

	R.	A.	P.
An iron adge weighing $1\frac{3}{4}$ seer,	3	0	0
A small hand-saw weighing $\frac{1}{8}$ of a seer (6 or 8 <i>anas</i>)	0	8	0
A chisel weighing $\frac{1}{2}$ a seer,	0	8	0
A gimlet or borer, turned as in India with a bow and leather thong,	0	4	0
A small hammer weighing $\frac{1}{8}$ of a seer,	0	4	0
A plane,	0	2	0
A file weighing $\frac{1}{8}$ of a seer,	0	8	0

Rs. 5 2 0

A man, with extensive business, who keeps a shop, has four or five saws which cost together 5 or 6 *rupees*. A two handed saw weighing $\frac{3}{4}$ of a seer costs 2 *rupees*, and he has other tools in the like proportion but of bad iron, and not better made nor more expensive than the tools of the poorest carpenter.

Labourers, porters, coolies, grasscutters, *gare-walas*, who mix mud for building and plaster walls, earn 8 and 10 *pys* a day from the British, and 5 *pys* from shopkeepers and husbandmen, if employed at hard work, but the Governor and principal officers of Roree give 4 *pys*, and the prince 3 *pys*.

Sun dried bricks are formed in wooden moulds, and the makers earned in 1838, 4 *anas* a day and double the sum in 1839; two more are required for the process, and will prepare two thousand in a day at the cost of 1 *rupee*; in 1838, they sold double the quantity for the same sum.

There are very few builders in Roree, and in 1839, there was a great advance in the price of labour, consequent on the number of public works in progress, and the formation of a new cantonment at Sukhur, and private individuals were obliged to procure workmen from Shikarpoor.

The washermen of Roree and Sukhur call themselves *soomrae* and do not wash by contract; they charge so much per piece and more for fine garments than coarse ones. Their charges are:—

For a silk loongee,	4 or 5 Pys.
For a turban, and drawers of soosee, ...	2 "
For a bochun, loongee, and woman's mantle, ..	1½ "
For a shirt, sheet, and petticoat of coarse cotton,	1 "
For a boddice,	½ "

Rich and poor pay alike; children's clothes are charged the same as adults, and a double charge made for washing new clothes. The principal *suyuds*, merchants, and bankers, change their clothes four times a month, and sleep in their drawers, but put off their shirts and *bochuns*. Tradesmen, shopkeepers, and peasants, change their clothes twice, and sometimes only once a month; they consider dirt of no moment and wear their clothes till they are offensive, and Moosulmans and Hindoos are alike neglectful of their persons, and filthy in their habits.

After the washerman has collected the foul linen from different houses, he mixes a quantity of camel dung with water in a large and strong earthen pan, throws the clothes into it and rubs them forcibly against the dung; he then srinces them, carries them to a river, and dips them into a vessel of water mixed with *khar* (alkali) obtained from a wild plant called *luna* which yields impure carbonate of soda, and is burnt to obtain the alkali. He beats the clothes on a plank cut into sharp ribs until the dirt and dung are washed out, dipping them occasionally into the alkali and water; he then srinces the clothes, and steams them twenty-four hours over a large earthen vessel built into the wall of his house, to purify them and take out stains, and on the following morning carries them back to the river and washes them as before. He then takes them home, and squirts some water with his mouth on each cloth to moisten it, and folds four or five pieces one upon the other on a table. He next beats them with a stout wooden roller about twelve inches thick and eighteen inches long, which he uses with both hands, instead of a smoothing iron, to flatten them, and they are ready for use. Neither starch or indigo are used as in India; a few washermen have copper vessels but they are scarce.

Common soap is compounded of mustard oil with lime and *khar* (alkali), pulverized and imbued with water in the following proportions:—

Lime	48
Alkali	12
Oil	27
Water	12

Four seers of lime are mixed with one seer of alkali, and three quarters of a seer of oil; the stuff is strained four or five times through coarse cotton rag into earthen vessels, one and a half seer of oil is added to lignify it, and it is exposed to the sun in an earthen vessel for two days, and stirred with a ladle until it combines; the paste is not run into moulds, but set on stones in the shade to cool and harden, and is cut into small square cakes with a knife. Soap is not made in Roree, but there are four or five manufacturers in Khyrpoor, three of whom came from Bauwulpoor, and the rest from Mooltan, and I believe the Scindians are not acquainted with the art. The price of soap in Roree in 1839, was 4 seers the rupee, and 5 and $5\frac{1}{2}$ seers in the preceding year.

The process of tanning and curing leather is generally inferior to the mode adopted in India; the leather workers of Larkhanu are however famous, and produce the best shoes, sword-belts, and water-skins in Sind. Good water-skins (*chhagul*) are made also at Shikarpoor and Kurachee, of bull's and buffalo's hide, capable of holding about six quarts, and a traveller always provides himself with one, or a tanned goat's or sheep's skin, before he starts on a journey. The native soldiers of the Bengal army felt severely the want of water, when the army crossed the desert between Shikarpoor and Bolan Pass in March 1839, and feelings of caste would not allow many of them to drink from leather. The Bombay Sipahis furnished themselves with water bags, and suffered comparatively little annoyance from thirst.

The form is graceful, and it is usually about eighteen inches long and fourteen inches wide, and sewn neatly at the edges with thongs; it keeps water very cool and costs about 2 rupees. The leather braces at the sides are to suspend the *chhagul* to a bush, or tent pole on a journey. (v. Fig. 2.)

A sack of sheep or goat's skin is used to carry water across the sandy deserts of Sind as the country does not possess the tanks, wells, and reservoirs which pious men have constructed in India, in uninhabited spots, and are a blessing to the way-farer and his beast. When the traveller arrives on the bank of a river, he empties the skin, blows it up, and binds it on his belly and floats buoyantly over the liquid element. On touching

land he lets out the air from the sack, replenishes it with water and resumes his journey. He fixes the goat skin with loops to the upper part of his thighs and binds it lengthwise on his stomach with the legs of the beast uppermost, taking care that his head is exactly between them. It is a delicate task to preserve the balance. If the traveller shifts a little to either side the skin it turns him on his back and it would be a miracle if he escape drowning. He is instructed to make short and regular strokes with his hands and feet and preserve his presence of mind. Two native soldiers of the British army, attempted in my presence to swim the Indus at Sukhur on skins with their clothes tied upon their heads, and did not accomplish a dozen yards before they were thrown on their backs in the manner described, and but for the assistance of some Sindees, who swam with them in expectation of the accident, they would have been drowned.

The following is a description of the rude process of tanning and curing leather in Khyrpoor. After the skin of an animal has been well rubbed on both sides for a day, with a solution of lime to remove the hair and cellular fibre, it is left twenty-four hours, after which the lime is washed off and the hide soaked in water for the same period. When removed from the water it is rubbed over on both sides with thick gruel of wheat and rice flour for another day and night, and dried four hours. It is then well rubbed with *goor* (molasses) and linseed oil and rolled up very tight. It is suspended next day to a wooden triangle and stuffed full of the bark of acacia and **khyr* trees which contains the vegetable principle called *tannin*. Water is poured into it three days and the tan liquor that falls into a vessel placed underneath to receive it, is poured again and again into the hide which acquires a reddish brown hue in about the period mentioned. The hide being withdrawn from the infusion of bark, is drained and dried by turning it in the sun twenty-four hours. Some finely pounded salt is sprinkled upon it and it is well rubbed inside and out with linseed oil. It is then subjected to heavy pressure with stones for a day, and afterwards rubbed dry with cloths which concludes the tanning process. The hide of a Bull, Cow, or Buffaloe costs 14 annas (9 pence) tanning and curing, of which six annas are expended on the materials and eight annas on labour. The sale price is 2½ rupees (5 shillings.)

One of the principal confectioners of Roree gave me the following list

* *Mimosa Chadira*. The Catechu (*terra Japonica*) is obtained from this tree.

of articles in his shop, which were, he said, necessary to carry on the business, and estimated the value at sixty rupees.

4.—*Kurahee*, Flat iron vessels with handles in which sweetmeats are boiled or fried.

2.—*Khoorpu*, Iron instruments for scraping off sweetmeats from pans and dressers.

2.—*Chutee*, Iron ladles perforated like a colander through which sweetmeats are forced with the wrist to give them a shape.

2.—*Khooruchnes*, a large scoop or iron shovel with a spout.

2.—*Chumchu*, large circular iron ladles.

2.—*Jhara chumuch*, one large ladle, and one flat spoon, both of iron and perforated like a colander, for making *luddoo*, a species of round comfits.

10.—Brassplatters (*Shalee*.)

10.—Wooden platter (*Khooncha*.)

2.—*Julebee ke turve*, an iron oven with a hole in the middle for making the sweetmeat called Julebee.

2.—Large brass bowls (*Kutorah*) with bamboo ladles attached to them.

2.—Small brass bowls.

2.—*Doa*, Wooden spades for rubbing and mixing sweetmeats.

2.—*Belna* Rolling pins.

4.—Dressers or tables on which sweetmeats are laminated.

2.—Table cloths on which *Butasa*, a kind of sweetmeat of a light spongy texture, is made.

2.—Sackcloth bags on which sweetmeats are laid in the shop.

1.—Wooden stool.

1.—Pair large scales.

1.—Pair small ditto.

Suyuds Ghoolam Shah, Yakoob Khan, and Ulee Ukbur Shah are wealthy, possess landed property, and keep domestics who live in their house; and there are also three *Suhokar* (great merchants) in Roree, who keep servants to fetch wood and water and cook their victuals. They get 3 or 4 rupees a month, and food once a day from their employers' mess. None of the other merchants and tradesmen keep servants, and journeymen who work for their masters in the day time return to their own dwellings at night.

Madhoo Rae Chhutree, formerly Moonsee of the deceased Prince Meer Sohrab, resides in Roree. He received a stipend of 120 rupees a year and 8 khurwars of grains, but on the death of his patron, his son and successor, Meer Roostum, threw the Chhutree into prison and extorted from him the sum of 3,000 rupees under pretext that he was guilty of peculation.

in office. The accusation was, I believe, partly true, but his enemies exaggerated his offence.

Hindoos do not hire barbers permanently, and give them a *pys* for each visit. Snayuds and wealthy Moosulmans have barbers on their establishments, who live, however, in the bazar, and practise their vocation elsewhere during their leisure hours. They yet 8 or 10 rupees and clothes every six months. The barber cooks the meat, rice, and sweetmeats for a marriage feast among Moosulmans, and receives for his services 4 rupees, a complete suit of caste off cloths including turban and slippers, and food during the period he is employed. He also shaves, washes, and decorates the bridegroom. He nets usually four or five rupees at a wedding, but it quite depends on the means of the family. The prince gives him 40 or 50 rupees. The barber carries the torch at Hindoo bridals (*burat*) which last from one to four days, according to the wealth and means of the bridegroom. For this service he gets a present of three rupees, and four *pys* from each family of the bridegroom's friends. He is an important member of a household, and Solyman, the prince's barber, is I believe, the only person allowed to serve him with water to drink.

There are eight families of *Mootrib* (Moosulmans singers and musicians,) who come from Sehwan, and attend marriages. The men are admitted to the bridegroom's apartments and their women to those of the bride. The men sing and beat the *dhol* and *nuggaru* (kettle drum). The women sing and beat the *dhol* only. The bridegroom and his friends give a few *pys* to each *Mootrib* on the days they attend.

The *Chokro* or cleaner of privies eats carrion, and his occupation is distinct from that of the *shekhree* or sweeper, who is more choice in his diet. Families give the *Chokro* from five to eight *pys* a month and food on the days he attends, which is not oftener than once a week at some houses, and morning and evening at others. He also frequently receives a cast off suit of clothes once a year. A respectable land owner of Sukhur of my acquaintance, gives the *Chokro* who attends at his house morning and evening, two rupees a month and food consisting of a seer of wheat or joowaree, and two *pys* instead of *bor*. Some people give grain at the end of a month (30 seers and 60 *pys*.) The *Chokro* employs his leisure hours in making screens or tatties of Surkund, a reed, and earns by both occupations about $2\frac{1}{2}$ annas or 4 pence a day.

Shekhree or sweepers, are not kept on an establishment as servants, but go round the city daily, and get from one to four *pys* for cleaning and sweeping a house, and earn thus from eight to fourteen *pys* a day. Shopkeepers usually sweep their own shops, and the part of the street im-

mediately opposite to them. The land owner mentioned above, gives the *Shekhree* who attends every morning to sweep his house, one rupee a month, and he earns altogether about four rupees a month. There are no sweepers or other public servants maintained at the charge of the city, but four or ten shopkeepers have a watchman between them to guard their property at night, and each pays him two annas (three pence) a month. The guard is not, I should suppose, very active, as he usually labours all day at another vocation.

Bankers and merchants live out of the Bazar in another quarter of the town and take with them sufficient money for their daily transactions, and lock up their shops at night, and carry away their money bags. There are two great *Suhokar* or merchants. Khooba, who has four *Gomushtus*, and Jeo. Both are inhabitants of Roree, and Hindoos of the *Bhata* caste from Marwar. Each is said to be worth two lacks of rupees.

The principal bankers (*shurraf*) are Tara, Koondun, and Tikyn also *Bhata*s. Tara is reputed to be worth two or three lacks of rupees, Koondun about two lacks, and Tikyn between three and four lacks of rupees. Tara has the most business and his credit and respectability stand high in the estimation of his countrymen and foreigners.

The Bunneahs of Roree deal in grain, tobacco, oil, groceries, spices, sugar, and fruit, and realise larger profits than any other class of tradesmen. Their daily receipts average from ten to twenty rupees and some in the British camp take as much as forty rupees. Grain and other articles brought from the country, are weighed before they are offered for sale by the *Mookhee* or chief of the trade, who is entitled to a seer in every *mun*.

The Bunneahs choose the *Mookhee* from their body by a majority of votes, and he is not precluded carrying on business on his own account in the usual way. They treat him with respect and submit all important questions for his decision. Instances have occurred of the townspeople ill-treating the *Mookhee*, and the Bunneahs closed their shops and refused to sell grain until the culprit was brought to trial and punished. He usually regulates the price current of grain, but the Bunneahs can alter it without his concurrence. He transacts a good deal of business for them and they reward him liberally. The *Mookhee* beats with a shoe or stick a Bunneah convicted of cheating, using false weights, or taking from a customer more than the market price of grain, but he may undersell his neighbours if he pleases. If a case of fraud is brought before the Governor, he levies a fine (*wutr*) of the delinquent and places it at the credit of government. When a respectable Bunneah

is imprisoned for a breach of the law, the *Mookhee* not unfrequently becomes his surety, or furnishes security in a sum of money for his appearing to answer the charges. The *Mookhee* also investigates debts and pecuniary transactions between *Bunneahs*, and adjudicates between them.

The readiness with which shopkeepers disposed of their goods to our troops at Sukhur and realized payment, the absence of imposts and the security afforded them against oppression, induced numbers to pass from Roree to the west bank of the Indus. Settlers came from all parts of Khypoor, Shikarpoor, and Larkhanu. They were principally *bunneahs*, cloth-merchants and confectioners, and there rose up in a short time, an extensive, bustling, and populous bazar which excited the wonder of the *Sindees*, who, familiar only with the sight of towns in decay and a decreasing population, flocked from distant parts to visit a market where a few short months before there was nothing but a Golgotha and a wilderness. I counted upwards of one hundred shops in the bazar six months after the arrival of our troops. The readiness with which the people drew to Sukhur was the more remarkable because they entertained considerable doubts if we should occupy Sind permanently, and felt reluctant to incur expense in erecting even temporary sheds to receive their goods. It might have taught Meer Roostum, if he had sense to profit by the lesson, how much could be accomplished in a short period under a just system, towards restoring the prosperity of a town, which enjoyed in time past, a high reputation for wealth and magnificence. There is little doubt if the British continue at Sukhur and the Prince persists in levying the present exorbitant duties and taxes on merchandise in transitu that Sukhur will encrease rapidly in importance and become the great emporium of the commerce of the Indus for which its situation admirably fits it. The merchants and bankers of Shikarpoor, Khypoor, and Roree who bury their wealth from the fear of robbers, will find a secure asylum within its walls, and those towns, being deprived of the chief source of their prosperity will share the fate of Thatta and fall away gradually in importance.

There are eight descriptions of officers and servants employed by government in the revenue, police, and customs, and paid once in six months. The officers and dependents of the Prince's household usually receive *jaegeers* and assignments of land in lieu of money.

The public officers and servants are :—

The Kardar or Governor.

Darogha.

Izardar or Revenue Farmer.

Masool or Karao.

Dhurwae, or Weighman.

Kotwal or Watchman.

Muhta.

Moohurrir.

The Kardar is the Magistrate of Police. Lattu Nimbhun, the present incumbent, is a Chhutree of Thatta and usually resides at the capital, and deposes his brother, Mool Ram, to administer the functions of office in Roree. He has held the situation two years, and has considerable property in land. He is frequently bribed by offenders against the law to remit their punishment, but enjoys on the whole a fair share of popularity. His stipend is 40 rupees a month.

Lattu Deeper, the Izardar, resides in Roree. The Darogha exercises a general surveillance over the Izardar or Revenue Farmer, and checks his accounts, and assists the Kardar to control the Police.

The Masool is invariably a Moosulman and under the Kardar. He receives a seer of flour and two pys per diem, and a *Khurwar* of grain every six months. It is his duty to guard the crops and to see that no one cuts and injures them.

A Dhurwae is nominated to every town and considerable village in Khypoor and Mogherlee, and his duties correspond in some respects with those of the *Dundeedar Dundiya* who collects the market duties in India. He weighs grain, oil, spices, drugs, &c. sold in the town, and receives from the dealer two pys on a *mun* of ghee and oil, and a double hand full of each rupee's worth of wheat, rice, joowaree, bajra, and other grain. No grain can be sold of a mun weight and upwards without his attending to weigh it. He usually helps himself to a great deal more than the quantity he can legally claim. Without waiting to see the grain weighed he thrust his hands into the heap and scoops up a couple of double hands full. This is so much the custom of these officers that shopkeepers almost regard it as their right, and do not utter a remonstrance unless the Dhurwae is more greedy than usual.

Since the British camp was established at Sukhur, the Bunneahs had such extensive dealings with their brethren of Roree, that to facilitate business, they found it necessary to have a weighman of their own, and appointed a Sindee to the office by consent of the Bunneahs of Roree.

Meer Roostum had no voice in his appointment and his transactions are confined to the town and cantonment. The proximity of a large military force to Roree, infused such bustle and activity into the heretofore quiet town that the Government Dhurwae did not find his receipts diminished by the interloper. The regulations framed by the Bunneahs of the British cantonment do not oblige them to employ the Weighman, nor do they avail themselves of his services in their transactions with the country-people, but they are valuable in other ways, and they fixed his remuneration at two pys in every *kora* and company's rupee worth of grain, vegetables, and fruit they purchased in the town of Roree.

The Kotwal fulfills the same duty in this country as the chowkeedar or watchman in India. There are five in Roree, who receive each 2 rupees a month, and one is nominated to each of the *chousool* or beats into which the great bazar is divided. The grain market, and other quarters of the town are without public watchmen and the inhabitants protect themselves. The Kotwals remain during the day with the Kardar from whom they receive orders. They collect oil from the shop-keepers of the great bazar to feed a lamp which is burnt at night in each watch house, and they usually get small presents of money and food from the citizens on occasion of a marriage, and are sometimes invited to the nuptial feast.

The Moohurrir or writer is either a Moosulman or Hindoo and one is appointed to each town. His stipend at Roree is 12 rupees a month.

There are several *multas* attached to the offices of Kardar and Izardar to keep the accounts of revenue and commerce and record offences against the law. There are also ten soldiers under the Kardar's orders ready to proceed to any quarter of the town which may require their presence. They are an indolent half-armed band much addicted to the use of *bhung* or hemp juice, and each receives a stipend of from 2 to 10 rupees a month.

The mortar of the oil mill used in Roree is the trunk of a tree seven feet in circumference, hollowed to the depth of eighteen inches and terminating in a cylinder. The diameter of the cavity at top is twelve inches, and it is calculated to hold a *naree*, or nine seers of seed. The mill is set in motion by a single camel or bullock which is changed at noon, and the quantity of oil that two camels or bullocks worked alternately, can express in a day, is about twelve seers, the produce of four *narees* of seed. Nine seer of seed yield by pressure about one-third oil, very rarely a fourth. Mustard seed (*surshuf*) sold in the Roree bazar in 18.9 at 4 rupees the *mun*, or 60 rupees the *khurwar* of fifteen *muns*, and the same price in the country. After a bad harvest the price rises to five rupees a *mun*. In the

autumn of 1839, $3\frac{1}{4}$ or $3\frac{1}{2}$ seers of oil sold for one rupee and 30 seers of cake (*khur*) for the same money. Oil cake is given to cattle with chopped grain stalks (*khurbee*), and is not converted to any other use.

Bullocks employed in a mill wear a cloth over their eyes, and camels small blinkers of basket work to prevent their shying. The pestle which revolves in the mortar has some times a pointed stick attached to it which throws back, of itself, the seeds and cake which fall over the mouth of the mortar as the pestle passes round. Sometimes a servant sits on the edge of the cavity and performs this office with a *rumba*, a sort of blunt iron chisel weighing about two pounds.

The lever E (see *Fig. 2*) is a piece of timber fastened to the Regulator D. with cords, and pierced by holes furnished with adjusting pins for the purpose of lengthening or shortening it when it is required to increase or diminish the obliquity of the pestle. At the extremity of the horizontal beam C. is a lump of clay modelled in the shape of a basket and bound together with sicks and date ropes. Some heavy stones are piled on the top and form a rude seat for the camel driver, and the camel is yoked to the end of the beam by ropes.

A camel for turning a mill costs 40 or 50 rupees, a bullock 25 or 30 rupees, and a press complete 30 or 40 rupees. The cost of two mills I examined was as follows:—

	Rs.	As.
Mortar of <i>ghana</i> wood A.....	20	0
Four square beams that surrounded the mortar B..	4	0
The pestle, lever E, and horizontal beam C. all round.....	3	0
Iron <i>rumba</i>	0	8
Four earthen pots for oil, each holding three seers.....	0	8
The carpenter who shapes the wood gets 5 rupees, and a meal a day for as many days as he is employed. It takes him about ten days to make a press.....	5	0
Cost of carpenter's food, say.....	1	0

Rs. 34 0

Three men are required for a mill. One drives the camel and feeds the mill, and receives 5 rupees a month and food from his master's kitchen. He is expected to extract four *narees* of oil when his labour terminates for the day. The second domestic cleans the camels or bullocks and prepares their food, and receives 3 rupees a month; and the third domestic brings water from the Indus for the use of his master's household and cattle and gets 2 rupees a month. All the servants are expected to assist occasionally in house work.

Oodoo, the proprietor of the mills I am describing, is the principal oil-maker in Roree, and has two mills worked by camels and bullocks, and three servants for each mill. He is a bunneah; and the produce of a *naree* of oil seed is carried away in an earthen receiver as soon as expressed to his shop for sale. He lets out his mill on hire by the day, or to press any quantity of oil, at the following rates, which include the services of domestics and camels.

	Rs.	As
For pressing a <i>naree</i> of mustard seed (<i>surshuf</i>),*	0	2
Hire of mill per diem for ditto,.....	0	8
For pressing a <i>naree</i> of linseed,† khus grass, and safflowers,	0	2½
Hire of mill per diem for ditto,.....	0	10
For pressing a <i>naree</i> of cocoanuts,	0	3
Hire of mill per diem for ditto,.....	0	12

The cost of feeding a camel and a bullock in the town of Roree is the same or about 3½ rupees a month, but a camel is more easily nourished in the jungle about Roree which does not produce grass and herbage for cattle. The oilman assigned another reason for preferring the camel, that he could, when not employed in the mill, make him more generally useful than a bullock, in bringing oil seed, grain, and fodder from the country.

Oil seed is measured with a *pinkee*, a wooden measure of fourteen † *anas* weight, and ten pinkees go to a *naree* of nine seers.

By far the largest quantity of oil consumed in Khypoor is obtained from mustard seed (*surshuf*). But the following are also subject to pressure, linseed § (*koonjuck*), khus safflowers (*puwaree*), and cocoanuts. Twelve seers of the best linseed yield half the quantity of oil.¶ The average return is from four to six seers and never less than a fourth. A small quantity not exceeding one or two seers is extracted at a time for medicinal purposes. The seed sell at 5 Rs. the *mun* of 40 seers, and oil at 32 Rs. the *mun*.

Khus seed sells at 4 Rs. the *mun*, and oil at 13 Rs. the *mun*. Ten seers of seed yield from 2½ to 3½ seers of oil.

* *Sinapis dichotoma*. Roxb.

† *Andropogon muricatum*.

‡ The *ana* is a weight equal to 6 shorabee rupees or the sixteenth part of a seer.

§ *Linum usitatissimum*.

¶ This is about the return in the district of Etayuh, 7½ seers of linseed, castor, and mustard, give about 3 of oil, and the man who works the press is paid in grain.

The return of oil from a *naree* of safflower seeds, if good, is 1 or 1½ seer but sometimes they yield nothing. The price of seed is 1 R. 11 As. per *mun* and oil 20 Rs. per *mun*.}

There is no demand in the town for cocoa-nut oil. The nuts are nets to the press across the desert from Jeysulmeer chiefly by the Rajah of that principality and are worth 18 Rs. the *mun*. If good, they yield half their weight of oil; the average return is one-third or a half.

(To be continued.)

Report of the Curator (HENRY PIDDINGTON ESQ.) of the Society's Museum for May.

For the month of May, I have to report as follows :—

Geological, Minerological, and Palcontological Departments.

—We continue to catalogue and arrange in these departments. I have been able, by the kindness of Mr. Prinsep, to recover three more of Dr. Voysey's note books amongst the papers of Mr. J. Prinsep, making in all 5 books of notes, from which I trust we shall be able to extract much valuable information relative to our collections; and it is only thus, by collecting slowly, putting together piece by piece, and collecting all with the series of specimens, that we shall be able to establish any thing like order, I regret deeply to state that I can obtain no trace of Captain Herbert's catalogue of his Himalaya specimens.

Ornithological and Mammalogical, &c.—Nothing new.

Osteological.—We have been able to acquire here two Samurs and a Neelghye for the trifling sum of 78 Rs.; both are desiderate in our collection. The Neelghye is killed for the purpose of obtaining its skeleton.

Botanical.—I have been fortunate enough to discover a box of Himalaya mosses, sent down from Simla in 1838, by Mrs. Siddons. Upon testing these, I find that, of 18 sorts, at least a dozen give very fine, and some of them brilliant colours (crimsos and crimson browns), so that they are thus of themselves of much promise as dying lichens; and will I hope give

rise to a spirit of enquiry to this hitherto neglected branch of the resources of India; specimens of the lichens and a box of the test liquors are on the table. I have embodied my remarks in a paper for the Journal, of which spare copies are also available, and now on the table. I beg to suggest its early communication to the Agricultural Society, with a set of specimens for their information.

Museum of Economic Geology.—From not being able yet to procure our cases from the native mistry we have not been able to finish our arrangements. We have obtained several valuable additions to this department, which I notice in the donation, amongst which are an excellent series, from the iron ore of Burdwan to the forged metal, by Mr. Wm. Prinsep; American lead ores from Mr. Tregear, with ores and specimens of various kinds from Ajmeer, by Captain Thoresby, and the Nizam's territory from D. Walker (M.A.). A very valuable, though not a showy contribution, is one of a specimen of fire-brick from Futtyghur; presented by Dr. Angus on the part of Dr. Hunter.

We have been able to make a very interesting discovery in this department. In some soils brought from Chedooba by Captain Halstead of H.M.S. 'Childers,' and referred to me for reporting upon, I recognised one resembling the curious Sea-Island Cotton soil of Georgia, which looks like a mixture of sand and charcoal (specimens of both are upon the table.) Upon a careful analysis they prove to be identically the same, and a special report has been made on the subject to Government. It is highly satisfactory, that, almost at its very outset, the Museum of Economic Geology should thus have given the most practical proof possible of its utility, by doing full justice to this valuable discovery of Captain Halstead's; for I need not remark that this soil was hitherto considered unique in the world, and thus was supposed to give the Americans a natural monopoly of the production of Sea-Island Cotton. We now

know that it exist in a country where cotton is a regular crop ;
and almost at our doors !

The additions to the Museum during the present month have
been as follows :

Conchology.—A shell called by the Chi-
nese Shew-cha from Chu-
san, } Captain Rankin,
Beng. Vols.

(Pollicesses cornucopia,) ..

Osteology.—2 Samurs,.... } Purchased.
1 Neelghye, }

Miscellaneous.—2 Neptune's Cups, } W. Prinsep, Esq.
1 Coil Assam Rope, }

A set of the coloured Li-
quids obtained by the am-
moniacal test from 18
specimens of Himalaya
Lichens in the Society's
collection, } Curator.

Museum of Economic Geology.—Soils
and minerals from Che-
dooba, } From Government

Fire-brick from Futtyghur, .. Dr. Hunter.

Ore, flux, slag and manufac-
tured iron ; from the Burd-
wan Iron-mines, } W. Prinsep, Esq.

Lead ores, from the Grossic
mine, United States, } V. Tregear, Esq.

Copper and other ores and
specimens from Ajmere, .. } Captain Thoresby,
O. R. Agent.

Iron ores and other speci-
mens from Hunumkoondah } J. Walker, Esq.
in the Nizam's territory, .. } M.D.

Museum, 1st June, 1841.

NOTE.—I insert this report in this No. with reference to a further notice on Che-
dooba soils which will appear in No. 114, and to which the above remarks are inductive.



JOURNAL

OF THE

ASIATIC SOCIETY.

Report on the Island of Chedooba.—BY EDWARD P. HALSTED, ESQ.
Commander of her Majesty's Sloop 'Childers.'

(Continued from page 377.)

DIVISION V.

Manners and Customs, Education, Language, and Religion.

The population of Chedooba is, with few, and trifling exceptions, entirely Mug, and from their isolated position, its inhabitants afford perhaps a truer exhibition of the character of these people than their brethren of the main land, or of Ramree, whose intercourse with their fellow subjects of different parts of the Peninsula, has by no means been attended with benefit to their original and national character. The Mugs of Chedooba, are a simple, moral, and inoffensive race, of frank open manner, cheerful, and forgiving disposition ; exhibiting much independence of feeling, the consequence of a thorough contentment with their lot ; respectful to their superiors, though perfect strangers to the crouching servility of the Hindoo ; throughout their character, exhibiting those traits, which are most readily appreciated, and admired by ourselves, some which might even be copied with advantage, and which, if duly fostered and encouraged, offer with his freedom from all the obstacles of caste a ground work whereon to elevate the Mug high, if not the highest, in all the benefits of European civilization of all the natives of the East, subjected to our rule, from whom in almost every point of character, as in appearance he differs most widely ; in the last particular less to his advantage, than in the

former, as his features proclaim him a Tartar, and are but rarely found modified with the more regular ones of the people on whose border he has so long inhabited.

The only custom among them, (other than the idolatrous ones of their worship of Gaudma) which appear at all repugnant to our own feelings, is that of a plurality of wives, which is permitted; but is a permission seldom taken an advantage of, especially in Chedooba.

The most notorious case met with, was in that of the Soogree of Mengbieng; a fine intelligent man of 45 with 3 wives, and a family of 18 children, from 24 years old to 6 months, all living in the most perfect harmony and peace under the same roof. Although in every respect *bona fide* wives, yet the two younger observed a dutiful attention and submission to the first and eldest, who was considered as the governess of the household, the others in regard to her, conducting themselves more as daughters. It was a curious and not uninteresting family scene, and I spent near two hours with them, enquiring, without the slightest offence to husband, wives, or children, into the peculiarities, and relative duties, and stations of a style of family partnership I had never before witnessed so extensively, and was answered with the greatest frankness and good nature, our remarks often causing a general laugh. The elder wife had supplied her share of the family circle, not so the two younger, and at least in this case, polygamy does not threaten a cause of depopulation to Chedooba.

Marriage is merely a civil contract unmixed with any religious ceremony or sanction, and is the result of mutual preference, as well as of the interposition of friends and parents. Those of the would be bridegroom proceed with fruits, flowers, wearing apparel, and ornaments to the parents of the bride, and seek her formally in marriage. If granted, the presents are left for the bride, to whose house the bridegroom proceeds in the evening, and where he resides and serves his father-in-law, not as a servant, but as a partner or a son for an indefinite period.

As with mutual consent the ceremony is performed, so with the same is it annulled, and though this privilege is not unfrequently acted on in the more populous towns of Ramree, and the Main, yet it is merely so in Chedooba, and three cases came under observation, where, although separation took place on the side of one of the parties, the other denied all acquiescence in the transaction, and with the community in general esteemed it a desertion. One was on an interesting case, arising from the conversion of the husband to Christianity; to all attempts at reconciliation on the part of himself and others, an obstinate denial was

returned by the wife, while he persisted on his part, on keeping and educating his children, two sons.

On Flat Island, the Soogree and his dame, had been man and wife upwards of half a century. They were both verging towards 80 years of age, and their direct progeny on the Island, with themselves, amounted to 50 souls.

In the case of mutual consent, both parties are at liberty to form a new connexion, and there are no such matters as family names, whereby such intermixture of families may be perceived. Not the slightest relation exists between the names of children and parents. All appellations have a meaning, the males generally of some enviable moral or personal quality, or happy anticipation of the future. The females of some tree or flavour, or feminine Mug grace.

Marriage generally takes place early in life; as soon as marriageable, the females assume a particular dress, a species of jacket, which is changed on that happy event to a larger covering over the upper parts of the body. The lower garment, both before and after entering on that state, admitting perhaps of improvement on the score of ampleness; on widowhood, the maiden dress is again assumed. An ample cloth around the middle, and a fellow one, thrown over the shoulders when cold, constitute the covering of the younger males, who as bachelors live in a distinct part of the village. The elders wear a white jacket shorter or longer; an article of this sort, made of dark coloured glazed cotton, slightly padded with the same material is frequently used by the elder males in the cold or fine season, and is brought from Ava, which also supplies a gaudy silk cloth of curiously interwoven colors, but coarse workmanship, which is used as a waist cloth on high occasions by all who can afford it. The common cloth is a cotton plaid of blue shades, and of home manufacture. A finer cloth or turban of white is used by the men, and interwoven with the hair, which, in both sexes, is of a beautiful glossy black, and great length and luxuriance, it occasions with both the only labour of the toilette, and they are very proud of this natural ornament. With the females, it is simply formed into a roll or knot at the back of the head, being parted for that purpose in front, and brought along the side of the head in a manner not uncommon in England; much good taste is sometimes displayed by the simple addition, as ornament, of some favourite flowers. Children of both sexes are frequently ornamented with silver rings on the wrists and ancles, and a string of silver coins around the neck; these are usually heir looms in a family, and in turn, grace all the young olive branches as they shoot forth.

Infants are slightly, if at all clad, and there is no custom among these people tending to produce any deformity of limbs, which from the birth are allowed free developement, nor is any care taken to prevent exposure to either sun or rain. Infants are seen in the houses of all the villages crawling about alone, and as soon as old enough to get down the, so called, stairs of the raised floors, they are to be found in groups amusing themselves without any controul, and naked as when born. The girls clothe when 5 or 6, the boys seldom submit to the restraint till 8 or 9 years old. This freedom enables them to exhibit in youth well made persons, tends to much personal activity, and inures them to subsequent exposure, without any fear of ill consequences. The government of their children is mild and affectionate, and is repaid by duty and attention in after life, and there is little evidence to be derived from their noise of crying, of the number of children who flourish in a Cheedooba Village.

Though well proportioned, and exhibiting a good share of muscle, especially on the lower limbs, they are a small people, and of moderate stature, the tallest among them not attaining a height of 5 feet 10 inches ; 5 feet 4 or 5 inches may be the average ; the females less.

Though with decided Tarter features, all search for any thing approaching to what constitutes in our ideas, beauty, must be in vain, yet there is an open expression of frankness and good humour, in the countenances of many of both sexes, and very commonly so in age, which with us must be allowed to pass in its stead, and among themselves constitutes that envied distinction. But truth compels to the avowal that this is found oftener with the males than females. The colour of the skin is not a black but that of a mulattoe.

Of ornament, when grown up, neither sex have any ; but a practice designed for such purpose in all other countries, is here transferred into one of every day usefulness ; with both, the lobe of the ear is perforated, and the large hole fully occupied with the ever accompanying cigar. A roll of paper fills its place, when not present, in order that the capacity of this natural cigar case may not be diminished by contraction ; where it can be afforded, silver is used instead of paper, and sometimes the white pith of a particular wood is used. When about to make a journey, the dimensions of the cigar are greatly increased, and it is then as thick as the fore-finger, and from a foot to 15 inches in length ; a party on the road with both ears thus mounted, looks not a little singular. Neither the practice of smoking, nor the method of carrying the cigar is confined to the men, and from infancy both sexes are accustomed to the indulgence ;

but as before noted it is of a most mild quality, and made principally from a leaf found in a jungle, with but little tobacco. It is the only one of an excitable nature in use, if indeed the mild mixture they smoke, is so at all. The only beverage is water, and though the licensing of shops for liquor and opium, is, in the more populous towns of Ramree, and the mainland, gradually tending to deprive their neighbours and countrymen of those parts, of the invaluable inheritance of national sobriety, Chedooba is as yet clear of the infection.

The acquirements of education are the result of the labours of the priesthood, who thus repay the maintenance allotted them by the public. All classes receive a like attention, the extent of which goes to the learning to read and write; of this benefit however, the children alone of the more populous villages of Chedooba principally partake, they alone being large enough to maintain continually an establishment of the sort, though every village has attached to it, a Riong or Church, and a School room, to which occasional visits are paid by itinerant priests. Spinning cotton, and the use of the loom are branches of domestic education, learnt by the females at home; while as soon as he is old enough to bear its weight, the boy sallies forth with his parent, and his dâh, to assist in clearing the jungle for cultivation, or in felling it for fuel.

The skill in the use of this weapon, thus learnt, is very great; in shape it resembles our bill-hook, with the sharp edge along the outer or convex side, but it is without the crook, longer and heavier, the largest in this latter particular fully equalling that of one of our own axes, with a blade nearly two feet long, and about 4 inches in width. With this weapon, the ease and rapidity with which the largest trees are felled is very great, and the Mug is perhaps as dexterous a woodsman as the Kentucky man himself; the facility with which acres of large trees were felled on the hill tops, to clear them for Theodolite observation, gave ample opportunity to note and appreciate his ability in this point, as from it was reaped a most valuable and correct means of effecting a survey, which without it would have been greatly increased in labour and sources of error, as well as occupation of time.

The tree is not felled so low down as with the axe, but breast high, which raises an objection to felling with it for timber, though not in mere clearing for cultivation. Every man in the Island has his dâh, which is his constant companion, and is in constant use, to fell his timber, to make his cart, his house, his canoe, his baskets for fishing or other purposes, and last not least to chop up his curry. A Mug without a dâh might as well be without a right hand.

In felling trees of very large diameter, an axe is made use of, it is a sort of thick chisel, with about a two inch blade, inserted into a handle knobbed at the end for its reception, where it is further secured by a seizing of rattan. This is a formidable weapon in a Mug's hand, and he fells his tree with it quickly and clean.

With a disposition greatly averse to any continued or fixed labour, the Mug yet is always on the move, either at work, or half amusement with his dâh in the jungles, or wandering through them from village to village; this constant out door exercise and use of limb, gives a suppleness, and developement of muscle to their legs and thighs particularly, which constitute him an untiring walker, and is very perceptible even in very old age, rendering him to the last independent of all other means of progression, and able still to indulge his love of rambling with those he was born with.

I found to my astonishment that the oldest man on the Island, numbering 106 years, had walked from his own village, a distance of 13 or 14 miles, in order to meet me at another, and walked back again on being disappointed. He subsequently came two miles from his own village to where we did meet, and during our interview, I could not but be much struck with the exhibition he made in illustration of the above remarks. While on his body the skin lay quite loose, and was perfectly festooned with wrinkles, his legs and thighs exhibited as much plumpness, and fullness of flesh and muscle, as they could have done, when they had performed but half their over century of work, and though in other cases I found old men, whose faculties had broken down under years, I never heard of one whose limbs had given way, or who was bedridden; a staff was all the assistance the above old gentleman required.

Beside the above out door duties and amusements all the heavier labours of agriculture fall to the share of the man; but the cleaning of the rice for ordinary consumption after it is brought in, is done by the women, with the instrument in common use for this purpose in other parts of India. This falls to her lot as one of the household duties which are assigned to her; but in none any more than in her general treatment and place in society, has she ought to complain of. Besides her household affairs, she goes to market, and prepares the family meal, at which she invariably eats out of the same dish with her husband. No restraint is imposed on her liberty, and she may attend all places of amusement and religion, unaccompanied by her husband. In the performance of religious duties, the women are more punctual and attentive, than the men. But she is restricted during her monthly state from

having any connexion with them; to this restraint is added, that she may not touch her husband's head, save for the purpose of cleansing it, when she makes obeisance before commencing work; that she may not touch the sacred books nor the consecrated image of Gaudma, nor pass over the shadow of a temple or any place containing the said image, but on foot and barefooted.

The villages of the western circles are, strange to say, in better condition, and cleaner than the eastern ones, and the houses display more neatness and attention to repair.

In erecting his hut, the Mug has only to purchase materials, the neighbours assemble as soon as these are prepared, and his house is established in a very short space of time. They are all constructed on the same plan, raised on poles from the ground several feet; the flooring and walls are of bamboo matting, wove in a neat pattern; the roof of the Ahtup leaf neatly covered with a frame work of bamboo to prevent its being injured by the monsoon winds.

All apartments whether sleeping, sitting, cooking, bathing, or private, are on this raised floor, through which all refuse finds its way underneath, where what is left by dogs and vermin, serves as manure for the garden attached to each house. Shelter is also afforded underneath to the poultry, of which they have much, and sometimes to the smaller kine. The kitchen range is formed by a round tray of moist clay about 3 feet in diameter, and 5 or 6 inches thick, leaving three small projections or columns on its centre, whereon to rest the cooking pot, when dried in the sun, it is fit for employment, and effectually protects the combustible floor; the furniture consists of a few reed mats, and each member possesses a wooden pillow, these are the whole amount. The rice for the family meal is served up in a wooden bowl, around which the whole party squat; the fish, flesh, fowl or vegetables are served in small coarse China tea cups, the right hand, and the mouth are always washed before, and after the meal; water is the only beverage at the meal, and when it is over, pawn is in use, and the cigar lit. Two meals suffice during the day, the one at 7 in the morning, the other at sun down, and both are very soon despatched. On taking a journey the meal is carried in a few leaves bound up with a rattan; on such occasions they have also a practice of cooking rice, which I believe to be peculiar; it is partly boiled, and then pressed with force into a bamboo, with a further portion of water, and when full, the bamboo is put into the fire, and roasted. The rice within, when dressed, thus keeps for many days, and a bundle of these bamboos is the simplest

manner of carrying more than a day's provisions through the jungle. When to be eaten, it is split with the dāh ; the rice is formed into a kind of semi transparent jelly of strong consistency with the soft inner lining of the bamboo firmly attached to it, which is eaten with it. When baked with milk instead of water, and with the addition of a little flour, rice cooked in this manner, is described as quite a luxury.

As in the construction of his hut, so in all other labours and necessities, the readiest assistance is rendered by every one to all ; hospitality is universal, and the last grain of rice will be cheerfully shared with the stranger ; every village has its traveller's house, and he who occupies it is the general guest. Besides being too independent to beg when able to work, amongst a people so disposed charity has no place, or rather the universal hospitality is exalted into that virtue. At a late period when the whole province suffered from the visitation of cholera, hundreds of children were orphaned, but neither were they sold as is common in India, nor was the assistance of Government called in charitable aid for their support ; all were adopted at once into families of neighbours or relations, and treated as their own sons and daughters. No part of the revenue was sought to be remitted, on account of the general calamity, but all was paid.

The Mug of Chedoooba is strictly honest, no such thing as theft is known among them, and even in the more populous towns, it is most rare, if known, for a Mug to be brought into court on such a charge. In their dealings with one another but one price is asked, though the simplicity and honesty of such a custom is giving way before the worse example of the Bengallee in the larger towns ; but no Mug will degrade himself by a charge of ' customs ' on the purchaser, for the benefit of his servant. To this may be added that in all my experience of them, I do not know to have had occasion to entertain even suspicion of their word. The Mug will not bear the restraint on his time, or his will, necessary to qualify him as a servant ; and though hard labour, when imposed, is submitted to with his universal cheerfulness, it is never freely chosen. Their respect and esteem of Europeans is very great, and any services in their power, were cheerfully performed for our party with no object beyond that of giving satisfaction. On many occasions I have found it necessary to despatch a messenger to the ship, both to take, and to bring communications or supplies ; the parties were always punctual to the time they would appoint for their return, but would never take a pice in remuneration, seeming hurt even at the offer, and whatever return was made them was always obliged to be given strictly as a present, and as a pledge of

approbation and kindly feeling. When engaged in the endeavour to bring down from the West Hill a large tree, which I was anxious to obtain, nothing could exceed the cheerfulness with which the labour was undertaken, in fact so much so as to give it more the character of an amusement; with the exertion of all the able bodied men of the Island, amounting to about 1,200 they were yet unable to move it after many days trial; and they requested assistance from us. With a party of twelve men, and purchases we joined them, and with this assistance the ease with which the tree was moved, astonished and delighted them; the labour was subsequently given up as occupying too much time, but up to the time of their dismissal to their villages, nothing but cheerfulness and good humour prevailed.

Not the slightest inconvenience was occasioned during their stay of 14 days in the neighbourhood of the village, which was our head quarters; parties were sent for their provisions from their own houses, and not a grain of rice or a fowl was demanded from the village, which was just as quiet, with the close neighbourhood of a body of men, as if no one had been there, the jungles affording shelter by night. A dinner was given to all who would remain to partake of it, on their giving up the work, the only return which could be made in approbation of their cheerful and efficient labour, and a promise was afterwards procured for the remission of a portion of the annual taxation, to those villages who were called on to render the greatest assistance in the labour of the Survey.

In the case of one of our Bengallee attendants who had struck a Mug, of which complaint was made to me, was afforded an evidence of their forgiving and unrevengeful disposition. The man though much hurt with the blow of a stick, and indignant at it, expressly requested on the offer being made, that no punishment might be awarded, all he required was that such treatment might not again be repeated. They are very fond of public amusements, which are generally given in honor of the exertion of some work of public utility, at these, plays, dancing, and wrestling take place; of the former two, not much may be said; of the latter, the most remarkable feature exhibited, appeared the total absence of all angry feeling on the part of the antagonist. Boxing is also at such times another exhibition.

Old age is treated with great respect, and the elders of a village, even when not officials, are consulted and listened to in all matters of debate relative to the interests of the community. When addressed they are called 'Apogee,' a title of respect.

From his frequent indulgence in bathing, the Mug may be inferred to be partial to cleanliness, but it is more with the idea of cooling his body that so much water is used, his head being seldom wetted, and on this score there is room for improvement in his character, as relates to person and to clothing, but especially with regard to children, whose great freedom from any confinement, calls perhaps for the greater recourse to means of cleanliness in their case.

The language of the Mug is with slight difference, the same as that of his neighbour the Burmah, of which it would seem to be a mere provincialism, and the similarity in this, in feature, religion, and all leading customs, and points of character, proclaim them both to be the offspring of one common stock. A difference in the pronunciation of certain of the letters, constitutes the principal distinctions between the two languages, and of these distinctions, that affecting the Y and the R stands first; the Y with the Burmese is always changed into an R by the Mug. The language in general use sounds uncouth and indistinct, but when properly spoken is said to be otherwise; it is difficult to acquire by Europeans.

The character again is the same as that of the Burmese, so that these people have all the benefit of the productions of the Moulmein press, which are printed in that character, and amongst these that of a translation of the whole Bible into their vernacular. Their own books which treat principally of religious or philosophical subjects are impressed with a style on dried leaves stitched together, and rubbed with the finer produce of the Petroleum wells to preserve them; paper is only used by the district officers of different grades. The religion of the Mug is that of Boodh, and in Chedooba I believe, the only exception to this, is to be found in the Christian convert, who has been before mentioned; in Ramree and the main coast, Mug Mussulmans are not uncommon.

How far the character of the Mug has been moulded by his religion, or how far it is the result of mere natural constitution, is a speculation well omitted here. But in the mild morality inculcated in the code, and practised in the conduct of its professor, at least an adaptation of the one to the character of the other is observable, beyond the common case in these matters, and is both pleasing in itself, and betokens wisdom if not goodness in the framer of the system; this much may be truly said in its praise, but to this is all favorable opinion I think to be limited. The sanction by which its observances are enforced are absurd, and unworthy the attention of a reasonable being. Its history a most childish invention, and is comparatively commendable again in its freedom

from the obscenity which stigmatizes other religions around it. It stands also peculiarly marked off from them, based on its principles of perfect selfishness, in not even acknowledging fear or respect for a Supreme Being.

Annihilation is the goal to be attained, not participation in the perfections, nor reward at the hands of deity; in reference to whose anger or approbation, not an action to be performed has the slight regard, even if his very existence be at all admitted. A certain amount of good deeds registered in the sacred books are to be performed, in order to entitle you to a happier state of existence for another life, which is again to be a scene of endeavour to the same purpose, and this gradual improvement in successive periods and states of existence (if merited) is to continue progressing till a certain point of goodness is attained, when as he can then become no better, existence itself is of no further use, and as the reward of all this labour, in the attainment of perfection, the fortunate being is annihilated; a consummation to which their object of worship, Gaudma, arrived in the most limited number of existences ever yet run through. On the other hand the usual terrors of transmigration are held out, and a fish or a dog, or some less reprobate animal, is to be the lot of those whose misdeeds prevail against their good ones. Some infractions of the law, indeed are of themselves sufficient to ensure such punishment, and I was gravely assured by the principal man on the Island, who was ordered to attend me throughout it, that if unluckily I did shoot a wild pig, hereafter I should meet my desert, in not only being turned into, but actually shot by one myself.

This person, the Soogree of Chedooba, was otherwise a very intelligent young man, and though the most zealous adherent of Boodhism on the Island, yet he seemed but half pleased with it, and was fond of bringing its merits into discussion, and never shewed the slightest symptom of annoyance at the laugh which a relation of its absurdities sometimes called forth, and which his better reason told him was well deserved. He had been at school at Ramree studying English, when called away to succeed his father in the Soogreeship 4 years since; and he had then built a *King* or Church, a work which had fairly committed him to as strict observance of all other good works, saving celibacy, as if a priest. In observing the prohibition to eat of any thing which had ever enjoyed life, in order not to encourage its destruction, he would not touch of food wherein were eggs or milk; but in the list of the protected the poor fish are not included, and he laughed heartily while taking advantage of his privilege, and making a sound

meal of some delicious oysters all alive. When on board the '*Childers*,' he reconciled his conscience to the indulgence of eating salt pork with the reflexion, that as it had been killed so long, and so far off, it was impossible it could have been killed for him.

The observance of this prohibition is the only one generally practised in the Island, and that more through habit, than with a sense of its religious necessity. In short, their religion sits but lightly on them, maintaining its supremacy more because it is unopposed by any other, than from any attachment of the people to its precepts or practice, and when discussing, and ridiculing its absurdities, as brought forward by our friend its advocate, the laugh and joke was fully participated in by all the hearers, who appeared much to enjoy and even promote such a scene.

All the Pagodas are in a state of ruin or decay, or rapidly approaching to it, and broken fragments of the image of Gaudma lie strewn about, without any one attempting the restoration of him or his temple. The old Christian before mentioned, had taken forth his god years ago, and both broken, and deserted him on the high road side, where his remains were pointed out to us without either mark or expression as to any impropriety in such conduct, but contrariwise, the forlorn state of the poor idol excited laughter instead of commiseration. On a remarkable hill in the centre of the Island stands the principal Pagoda in the common ruinous state; no pious hand, had for many a year attempted to annihilate himself by its restoration; but whether in waggery or not, its chief ornament consisted of a cut glass decanter, turned bottom up, on a bamboo stuck into its pinnacle, and excited the laughter of our native party, as much as our own.

The Mugs are superstitious, and though by no means more deficient in personal courage than their Burmah neighbours, yet exhibit in some points a weakness, which might cause a doubt on this point. No Mug will travel alone in the dark, nor even on moonlight nights, for fear of evil spirits or Naths; but when together 'three Mugs will face the devil.' Nothing but positive order and accompaniment by us would induce them to trespass on many of the hill tops, which were inhabited, they said, by these demons, but with us not only would they advance fearlessly, but did not hesitate to fell the trees, though the blame of such sacrilege was always laid on us, in direct apostrophe to the supposed injured inhabitants. On felling any very large tree one of the party at work on it, was always ready prepared with a green sprig, which he ran and placed in the centre of the stump, the instant the tree fell, as a

propitiation to its spirit which had been dislodged so roughly, pleading at the same time the orders of the strangers for the work. In clearing the top of the South Hill, the Chupprassie, whom I had sent to see it done, though attended to the summit with the labourers all ready prepared, was forced to take a dâh, and fell the first tree himself, before a Mug would make a stroke, and was considered to bear all the odium of the work with the disturbed spirits, till our arrival relieved him of the burden. On such occasions, with their customary cheerfulness, the whole body would join in the laugh at the folly of their own superstitious fears, of which they latterly seemed half ashamed. Several of the circles are without any priest at all, and those who are found on the Island do not suffice for the instruction of the children, a subject complained of, and offering an opening of favour to these simple people, which has only to be afforded in order to be appreciated and embraced. Any person of any religion has only to assume the dress and follow the observances of the sacred book, and he is at once acknowledged a bona fide priest.

At Meugbreng an old priest paid me a visit, and begged alms, the only case I ever met with, and not only unnatural, but most unpriestly; he avoided the prohibition to touch money by taking it through his yellow gown, and then handed it to an attendant pupil; he had been a Soogree in one adjoining circle, and gave up his office in order to get worshipped as he said. He was nearly 80 years old. No distinction of caste is recognized by their religion, and the priest both eats, and will accept the offering of all and every class. There exists however on the Mainland, some distinction of this sort, observed among the laity; they are the remains of the political quarrels and dissensions of the Mug Raj, and are fast wearing out. They consist in feelings of prejudice against the eating and drinking with those who are descendants from the captives of former wars, to whom the most menial offices were assigned; they have no existence on Chedooba, nor will have shortly elsewhere among the Mugs. The priests are forbidden even to look at women, even their eyes may not wander above a limited distance beyond their feet, lest they should light on the forbidden image; he may not eat after midday, when his second meal is taken, his first having preceded it about 6 hours. The dead are burnt, the bodies of priests with great pomp and ceremony, after being preserved a considerable time, and the bodies of all with decency; this constitutes a very meritorious deed when performed with the remains of a stranger.

Chedooba as observed, has not many strict votaries of Boodhism; but its effect in the neighbouring countries where acted on in strictness, is

curious in some particulars. It has a direct tendency to destroy all feeling of gratitude, the real favor conferred being on the part of the receiver, in the opportunity afforded by him to the giver of performing a meritorious act. Robbery and even murder have been committed for the sake of the means of erecting a church, or constructing a road, or a tank, and the end has consecrated the means. These good works are performed in Chedooba as elsewhere among Boodhism, but I was inclined to think with motives more pure, and that the general character of its inhabitants would justify the opinion, that the reward outwardly and inwardly reaped by the performance of such public benefactions, is inducement enough to their execution there.

The construction of such as above, of wells, traveller's houses, or the keeping of any of these in repair, renames the party undertaking them, and he is thenceforth only known by the honorable title of the 'well digger,' the 'road maker,' the 'house builder,' &c.

The old Christian above mentioned, is the only one on the Island, and is a sincere, and pious old man, deeply interested in the improvement, social and religious, of his Island countryman. He is intelligent and well informed for his means, of the mildest manners, and benevolent appearance; though between 75 and 76. His pittance is small, 5 rupees a month from the American Baptist Mission, of which he is an assistant; he is listened to with great attention and curiosity, but, unsupported as he is, and with but little encouragement, his success is small.

Ramree, the chief town of the Province, enjoys the privilege of a School, where English is taught, and Chedooba, as a part of the province, is entitled to send its quota of pupils. But the habits of the people, and even the regulations of the school, deprive its inhabitants of making almost any use of it. Payment is required; there may be no friends at Ramree to take charge of the children, and the Chedoobans are attached to their Island too much to allow willingly even their children to leave it for any length of time, very few parents, therefore, and those chiefly the Island authorities, give their children the benefit of the advantage offered by the provincial school. But the payment which is begrudged to the Ramree establishment, would be willingly made even in higher amount to one at home; both children and parents in Chedooba are all common friends, and mutually known; and such an establishment, which the deficiency of priests, for educational purposes, points out as wanted, would soon meet with that most grateful appreciation of the boon, a large attendance, nor in other respects would it be without reward to its founders. Not a whit behind his Ramree brother in intelligence and

desire to improve, and especial desire to learn English, the simpler, and more honest and moral character of the Chedooba scholar, would give to him the preference, for filling those grades of employment in the public offices open to him; while the grateful reflection would not be wanting, of affording a valuable means at once of improvement, and of the maintenance in fact from contamination, of a character high and rare, to perhaps the most interesting community under the Government of British India.

DIVISION VI.

Geology.

The Geology of Chedooba presents characters of so much general interest, that any report on this Island might be looked on as imperfect, in which the subject was wholly omitted.

But as it is intended in a separate notice to give such details, accompanied with specimens, as may render the subject capable of investigation, by those able and interested in the science; the present one will be here confined to a mere statement of the general features exhibited. The elevation, out of the sea, of large tracts of land by effect of volcanic action, has in more modern times been noted as occurring on the coast of Chili in South America, and in the territory of Cutch in this country. In the former case some doubt has been thrown both on the fact itself, as well as its amount; and the circumstance of a similar phenomenon having taken place within the memory of man, not only throughout the coasts of Chedooba, but extending over all the shoals and islands from the Terribles, off the north end of Ramree, to Foul Island, will be held a not unwelcome addition to the evidence yet gleaned of the occurrence of such extensive changes of level in the present day. The above are the limits of the survey on which the '*Childers*' has been employed, over every part of which the evidences of this elevation were seen, and in many places accurately measured, and it includes the whole of that irregular collection of Islands and shoals, which, projecting far into the Bay of Bengal, yet maintain the general direction of the main land coast near it.

But these limits are not to be taken as those which bound the elevation, which, with little doubt, from similarity of formation, will be found to extend north and south and east, over all these parts of Arracan, so peculiarly marked by the intersection of deep narrow, salt water creeks, from Akyab, even perhaps as far south as Cape Negrais.

The line which was under observation is about 100 miles in length, varying from 20 miles in width, to that of a mere patch, according as

opportunity of notice was afforded by the existence of rocks or islets above water, and its general direction is from N. W. b. N. to S. E. b. S. The elevation has been greatest towards the centre of the line examined; at the Terribles about 13 feet, on various parts of the N. W. reef of Chedooba 22 feet, at the north point of the Island 16 feet, at the centre of the Island on the west coast 13 feet, at the southern end 12, and at the Islands south of it, as far as Foul Island from that to 9 feet.

It would also seem to have been greater on the western limit of Chedooba, than on the eastern, a fact not however ascertained from the extensive level plains which exist on this side, whereas on that, measurement was easily made on the sides of perpendicular rocks. This elevation occurred about 90 years ago, and there is, now living, a party 106 years old, who was then 15 years of age, and had been accustomed to fish over a portion of the now upraised land. On the coasts of Chedooba, its traces are in most parts as clear as could be wished, bounding the natural jungle with a bank of greater or less height, composed of sand or of shingle—the plain beyond being thickly strewed with coral and shells, such as are now growing on the shore. The natives are all perfectly aware of the bank having formerly been the limit of their Island, and even the youngest would point it out, if asked to do so.

The old man above mentioned was not in Chedooba, but at Ava, when the event happened, he had gone thither that year, and experienced at that place the violent earthquake which accompanied the elevation. From other natives of great age, I received information of the occurrence, not direct, but traditionally from their parents.

The earthquake was very violent, the sea washed to and for several times with great fury, and then retired from the grounds, leaving an immense quantity of fish; the feasting on which is a favorite story throughout the Island; no lives were lost, no rents in the earth occurred, nor fire from the volcanoes of the Island.

The above is not the only event of the sort traditionally known, another occurred a century previous to it, and these elevations are considered periodical by the inhabitants, occurring every 100 years, and the next one is even expected in the course of a few years, and would excite but little surprise. Traces of a third beach line were several times thought to be found, before this information was given; but on the western coast, about half way down, an evidence of its truth was afforded; a remarkable column or rock, about 40 feet high, standing on the beach shewed the remains of a second line of rock. Oysters adhering to it, at an equal elevation of 13 feet above the first, as it was again, above the one, which on

all the rocks of the western coast distinctly points out the limit of the present high water. On Flat Island was subsequently found three distinct beaches, and the coral found on the different extents of the Island clearly proclaimed in their relative states of decomposition, the difference of their periods of exposure.

The external and more apparent means by which these great changes are effected, are as yet known, I believe, quite peculiar, and exhibit features which may be valuable in assisting investigation into the immediate causes of volcanic violence.

Every one of the mud volcanoes of Chedooba were visited, and examined as well as those of the neighbouring Islands, south of it, and on none with strictest search could be found any traces of direct fire, or of those peculiar formations produced by that agent, gas alone seems to be the one immediately occasioning these strange exceptions to the general character of volcanoes. It is no doubt inflammable gas, and the light given by some of them in activity has been so great as to enable a book to be read by it at a distance of 9 miles, as was credibly related to me as having occurred at the last eruption of the large Volcano of Meugbreng, the largest on the Island: that heat is present in the more recent ones, I found it myself to be the case, in one examined on Ramree, where the mud brought up on a bamboo from, 17 feet in depth, shewed a temperature of $92^{\circ} 20'$ above that of the atmosphere. But a white stone like chalk found on all the large volcanoes, which was considered as the common greenish sandstone discolored by heat, was the only substance found, which exhibited a trace of no intense heat, and in this case the abstraction of color alone was effected without the least change of composition or form. The large volcanoes of Chedooba are four in number, they are detached mounds rather than cones, varying from 100 to 1,000 feet above the level of the sea, composed of a stiff grey clay with large quantities of singular fragments of stone, their sides much cut up by the effects of rain, their summits quite bare, and from 240 to 50 yards in diameter; on these are disposed cones of stiff clay from a few inches to 4 feet in height, and the same variety of dimensions, in diameter. These are hard on the outside, but filled half way up with a thick well mixed mud, which every now and then exudes from a hole at the sides or summit*, at the bursting of a bubble of gas which occurs every 3 or 4 minutes. There are two other volcanoes of small dimensions, and but little elevated above the plains where they are found to exist; they are composed of the same

* The readers of the Journal will be struck with the similarity of the description to that of the mud pools at Hinglaj.—*As. Soc. Jour. No. 94.*

soil of mud, emitting large bubbles of gas; and besides these there are two spots whence water alone is brought up by the gas. In all these the water or mud is salt, and their number with the four Petroleum wells which are in constant ebullition with gaseous exhalation, seem to exhibit this agent as powerfully, and extensively at work, throughout the Island. The minor volcanic vents seldom exhibit any change; the larger ones when in eruption, which generally takes place during the rains, either throw forth to a considerable height accompanied with flame, fluid mud, which spreads over a certain extent, or the surface effected boils with the escapement of gas, bring too consistent to flow or be thrown up. The angular fragments of stone mixed with the mud are clearly torn from the strata, through which the vent is forced, and small portions of copper ore are found attached to some.

Besides the volcanoes seen, one was described as existing under water on what is now a reef N. W. of Flat Island, and which a few years since gave forth flame when in eruption. But independent of such direct evidence a mere examination of many of the reefs would convince of the fact of the bed of the sea being equally affected with the surface of the land.

I conclude with the observation that the clearness of the jungle of Chedooba, the healthiness of its climate, and the late clearing of the principal hill tops for purposes connected with its survey, afford for the ensuing fine season a most interesting ground whereon to examine, more minutely than either time or ability would enable me to do, the peculiar geological features thus briefly noticed.

Examination and analysis of a soil brought from the Island of Chedooba by Capt. HALSTEAD, of H. M. S. 'Childers,' by HENRY PIDDINGTON, Offg. Curator Museum Asiatic Society.

This soil was sent with a collection of soils and minerals from Chedooba, for the Museum of Economic Geology, with a request that a report might be made upon them. I was immediately struck with its resemblance to the finest Georgia Sea Island cotton soil which I analysed in 1838, and which has such a peculiar appearance—resembling a mixture of sand and charcoal—that it immediately attracts attention; I thought it well worth while to ascertain their identity. To show how nearly they are like I set down in parallel columns the results of my examination of the Chedooba soils and of the American one; the last abridged from my paper on the cotton soils of America, India, Mauritius &c. in vol. VI. of the Transactions Agrl. Soc. of India, p. 198.

APPEARANCES.

*American Soil.**Chedooba Soil.*

1. When sifted, like fine dark-
grey sand and charcoal dust, arti-
ficially mixed. } The same.

2. The sifting coarse sand, frag-
ments of sandstone and shells with
pieces of dried and charcoal wood,
or charcoal in all states from char-
coal to soft lignite. } The same, but no shells, and the
sandstone in very minute frag-
ments—perhaps owing to the spe-
cimen being in very small quan-
tity.

With cold water.

3. When agitated settles in a
coarse greenish-grey sand, with a
layer of black matter above it. } The same.

4. When left for a day or two
water is tinged of a pale yellowish
colour. } The same.

Heated in the Matrass.

5. Smokes and gives out a
strong peaty odour. Silver leaf
and litmus paper are discoloured
and a brown smoky-tasted oil is
deposited in the tube. } The same. The silver leaf I think
more discoloured; the litmus pa-
per not so immediately. In all
other respects the same.

Analysis gave

Saline matter, Mur. of lime and soda, but no po- tass.....	0.20	Saline matter Mur. of lime and sulphur of soda, but no potass	
Vegetable matter: most- ly lignite or peaty powder with a little water.	3.20	The same	2.00
Iron, protoxide.	1.00	Protox. (and peroxide in small quantity ?)	1.75
Carbt. of lime	2.76	Carbt. lime.....	3.00
Alumina.....	0.20	Alumina	0.40
Silex	92.00	Silex	91.65
	99.15		99.05
Water and loss..	.15	Water and loss..	.95
	100.00		100.00

Remarks.

<p>Silex is mostly in coarse glittering grains like pounded loaf sugar, shewing that it is mostly from <i>disintegrated</i> and not decomposed rock.</p>	<p>The same, but grains of silex duller and more powdery, silex with them.</p>
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N. B.—The smell of Petroleum is owing to a bottle of it having been sent in the box.

For all agricultural purposes these soils may be pronounced so nearly the same, that, in the same climate, the difference would only lie in the amount of produce being a little more or less on the one than on the other. The Chedooba soil contains but one ingredient, Sulphate of Soda, not found in the American, but this is in extremely minute quantity, and moreover seems favourable to the growth of cotton, for the soil of the Tinnevely district, which produces the Madras, Bourbon cotton, contains it, as does also that of Singapore, on which very fine Bourbon cotton is grown.

Captain Halstead's remarks on this soil are as follows.

'No. 11, represents the more sandy soil of the eastern circles. It was taken from the neighbourhood of Meugbreng. The circle of that name with the one just noticed (Mrooma) are the most populous on the island, the greatest quantity of exports being produced in these, and chiefly on this soil—a more productive one than its appearance would seem to warrant.'

The importance of this curious soil to America we well know. It may be hoped that ours may be ere long turned to account and that many other spots on the islands and coast, from Akyab to Sandoway, may be found to possess it. From difference of climate, as far as this may affect the cotton, there will be, I trust, little to fear, for we know that the dry months allow time enough for the production of all kinds of cotton, some of very fine quality, on the main land of Arracan; and it is mentioned as a product of Chedooba by Captain Halstead. Very fine Sea Island has been produced on Saugor Island, and the late Mr. Kydd gave me a very beautiful sample of it, which he said was grown there 'upon a sort of black sandy soil' but I could not obtain a specimen of it. I venture to suggest that if a small quantity of the Sea Island seed was sent down to the Commissioner, accompanied with a brief notice, to be translated into the Mng language, and distributed with the seed, stating what it was, its great value when carefully picked, and that no sort of extra rent or claim would be made for this kind of cultivation, we might hear of it again? Small prizes might be offered to those who produced the best samples.

HENRY PIDDINGTON.

List of Soils and from whence taken.

1. Clay of upraised plain, near the N. W. point of the Island.
2. From Rua Tanghee inside the above plain.
3. From the N. W. peak.
4. From the West Hill.
5. From interior of Krae-roue circle.
6. From Eastern part of Krae-roue circle.
7. From Petroleum well of Krae-roue.
8. From West part of Inrooma circle.
9. From central valley of Inland (Inrooma circle.)
10. From Petroleum well of Inrooma circle.
11. From village of Meugbreng.
12. From interior of Meugbreng circle.
13. From Tang-roa circle near Rua Sekkea.
14. From the summit of Pagoa Hill.
15. From Ree-giung (Flat Island).
16. Iron ore from North beach of Chedooba.
17. Copper ore from different volcanoes of Chedooba.
18. Coal or lignite from Tang-roa circle.
19. Petroleum of Krae-roue.

It appeared advisable to attach to the accompanying selection of the soils of Chedooba, the few following observations on the subject in addition to the mere list of places whence each was procured.

In making the selection, which was done during a progress on the greater part of the Island, high and low, jungle and cultivated, and mostly on foot, from the 1st of January to the beginning of March, care was taken to choose soils which should represent those of the greatest extent to be found on the Island, and where specimens have been taken of soils less general, they have still existed over extents ample enough to afford room for the cultivation of that produce, for which they might be considered most applicable. But here it may be at once observed, that no material difference or contrast was found to exist in the soils of Chedooba; a clay of light brown or grey colour, more or less modified, as it had been subjected a longer or shorter period to the effects of tillage or natural vegetation, constituting the bases of all. This clay base being again on the eastern parts of the Island found with a large admixture of fine sand. This clay base seemed to give throughout a permanence to the productiveness of the soil, which must constitute a very valuable quality,

placing it on a par with those which if more fertile or sooner exhausted, from generation to generation the same lands being yearly cultivated without manure; traces of lands lying fallow it is true, were discoverable in many parts, and sometimes extensively, but on enquiry they proved to be those which had fallen out of cultivation from the decrease of population attendant on the disturbed state of all these countries for many tens of years previous to our occupation of them, and not from exhaustion of the productiveness of the soil. But the clayey nature of the soil appears to make it liable to yearly improvement by a process of manuring of natural occurrence, and which is most effective where most needed, in the newer soils of the lately upraised lands.

During the dry weather the surface of the soil becomes cracked in every direction to a considerable depth, but mostly so in the above lands, where a stiffer clay is found, and into these cracks dried leaves and grass at such times fall in considerable quantity.

A custom is also prevalent of burning the dry grass, stubble, &c., every year at the close of the dry season, the ashes from which are therefore all ready to be washed deep into the body of the soil, by the first heavy rains of the monsoon, which do not close the large openings for some time. The large quantities of Coral and Madrepore distributed over the surface of the new plains, is also by this practice of annually burning very much aided in its decomposition.

I was informed by a native that the extensive new plain of the N. W. part of the Island, which was raised out of the sea about 90 years ago, was only then acquiring its first covering of grass when visited by him 15 years after its elevation. That produce now covers most parts of it high and luxuriant enough to screen a buffalo from sight, while other parts yield ample crops of rice, and where not otherwise claimed, the jungle is fast taking possession of it, especially over those more rocky portions which have on them the greatest amount of Coral.

The clay soil of this plain is shewn in No. 1, compartment. Embosomed in trees on the old N. W. point of Chedocba, and therefore just within the border of the above plain, stands the village of Tanghee, the soil of its neighbourhood includes a larger amount of vegetable mould, than is to be found in that of the plain so low as will be seen by the specimen of it in No. 2.

This soil may be taken as representing all the cultivated soils of the western part of the Island which lie within the limits of the old beach time. It amply repays all labour bestowed on it, though such labour is at present small, owing to the smaller amount of population to be found in

the two circles of Kam-mad, and Tang-wa, which enclose this side of the Island, than in any of the others with one exception; this want of population arises from other causes than any connected with want of productiveness in the soil.

Chedooba was originally peopled from the eastward, and has never been so thickly inhabited, as to oblige the cultivation of the western lands, which have therefore been hitherto visited, more than inhabited, the want of gratification for his social habits always driving the western settler, after a certain period of sojourn back again to his more thickly populated native village to the eastward. The present Rua-gong of the village of Kammaa was formerly Soogree over but seven houses, in a district where his own village now numbers 300.

The extent of plain between the hills and the sea, half way down the west side of the Island is small, but I here saw one of the largest and richest gardens of plaintains in the whole Island, while as the general produce of the above soil along the limits mentioned. I observed, rice (the staple) tobacco, sugar cane, some cotton, hemp, and indigo (in cleared spots in the jungle); of fruits and vegetables, the cocoanut, plantain, orange, lime, tamarind, yam, bringals, and other garden produce of these climates.

The specimens in 3 and 4, represent the soil found generally in the hilly, and jungly parts of the Island. The largest and most luxuriant trees in the Island are found in the loose friable soil which is found on all the hill tops, in that of No. 4 were flourishing perhaps the very largest on the Island. An oil tree felled measured for a length of 60 feet, 4 feet 6 inches, and 3 feet 6 inches in diameter at its respective ends, and a like tree left as a beacon, on the summit of the hill, measured 21 feet 4 inches in girth, as high as the arm could reach.

In mentioning however the size of these trees, it is not to be inferred that valuable timber is to be looked for as a produce of Chedooba. The largest trees are almost exclusively confined to the hill tops, where they are difficult of access, and of no very valuable quantity, enough however, and of sufficient size, and good quality for all domestic purposes, is every where to be found, nor do I doubt that woods, affording valuable produce of different kinds, would on examination be found among the jungles. The wood-oil tree as has been observed, was found in luxuriance on the west hill, where was also the gamboge, and many trees large and small yielding caoutchouc, some in great profusion. I would here mention while on the subject of the jungles, that no part, in the many miles of it, travelled through, appeared to offer any serious ob-

stacle to clearing for cultivation ; there are few parts where a Mug with a good dâh would not fell in one day the trees over half an acre ; much of it consists of open clumps of bamboo, and throughout the lower part, open plains of grass of more or less extent are very frequent ; in no part which was seen would a person on foot find any obstruction in walking which way he would, and this is stated from experiment, having been over many parts where no native ever before penetrated, not from inability but from superstitious fear.

No. 5 and 6 represent generally the soil of the Krae-roue circle, the Northern one of the Island of which parts are more sandy than others, but the whole very productive. I found the betel in this circle first, and in its jungle, of which it has a due share, the caoutchouc plant of South America ; a good deal of Rice for export is here grown.

No. 7 is a soil taken from the neighbourhood of two Petroleum wells, which lie close to one another in this circle, having no doubt one common source of supply. This article, as may be seen, is surely a produce of the soil, which by simplest means might greatly be increased ; at present these two wells yield about half of the 300 pots, which constitutes the yearly produce of the four petroleum wells of Chedooba.

No. 8 is a soil taken from the next adjoining circle, eastward to that of 'Inrooma.' Its principal village (Chedooba) boasting to be the capital of the Island. The specimen, and No. 5 may be taken to represent the interior and more clayey soils of all the Eastern circles, including those of Inrooma, Mengbreng, Kyouk-tair, and the eastern part of Tang-rua. While No. 9 taken from a spot in the same circle, is, I apprehend of more limited extent.

Near the centre of the Island, and not far from the large Volcanoes of Meng-breng we came on a small level valley with a stream running through it, on either hand overlooked by wooded hills. This valley whence No. 9 is taken, was the best cultivated spot I had yet found, being one continued tobacco garden and were the best of that plant on the Island is produced. While speaking of this article, I venture to express by belief that parts of Chedooba would produce with proper care and attention, as good tobacco as perhaps any in the world ; and here I speak also from experience. My own stock of Cigars having been expended, I procured some to be made for me on the Island, out of native tobacco, many of which to my gratification and surprize I found of as high and as delicate a flavour as any which I had ever tasted direct from the Havanna. But the leaves of which these were formed, appeared to be accidentally larger and more ripe than they are generally gathered. Though as it is at present planted and prepared. Chedooba tobacco is highly prized.

No. 10, shews the soil from the neighbourhood of a petroleum well in this circle (Inrooma). Some time since it was destroyed by fire, since which the public claim it, but its produce is therefore nothing, though the soil is full of the oil.

No. 11, represents the more sandy soil of the eastern circles. It was taken from the neighbourhood of Mengbreng. The circle of that name, with the one just noticed (Inroöma) are the most populous on the Island the greatest quantity of export rice being produced in these, and chiefly in this soil,—a more productive one than appearances would seem to warrant.

No. 12, is also a soil of the Mengbreng circle, and taken from a spot about 3 miles W. S. W. of the village of that name, and amid the jungle. It may not be put forward as a representative, though in the neighbourhood whence taken, it may be extensive. The largest trees were found on the lower grounds principally; the wild mangoe were found growing in this soil.

No. 13, from the Tangee, a circle and neighbourhood of the village of Tekkea, at the foot of the south peak, is again a soil peculiar as far as was observed. East and west of it the cultivated soils are represented by No. 2, while Nos. 3 and 4, perform the same office for the soils of the hills which are highest in this the southern circle of the Island.

No. 14, is a specimen of the most peculiar soil on Chedoooba, taken from its only barren spot, the higher parts of its central hill.

No. 15, is not of Chedoooba at all, but from its sort of dependency, Flat Island, separated from it by a narrow strait. It has been added from its great similarity to the stiff clay of No. 1, whose productive properties it may serve perhaps to illustrate.

It was taken from the centre of the Island where it had been under constant cultivation for more than one century, yielding an ample annual return. Every patch of available land on this Island is fully tilled, its centre, one continued rice ground.

Nodules of Iron ore, as in No. 16, will on search be found generally over the Island, either embedded in the greenish sandstone, or having been detached from it. Though often very rich, they are not in sufficient quantities to amount to valuable, nor am I of opinion that the ore in continuous beds will by any search be discovered.

No. 17, shews some fragments of copper ore, a few also of silver may be found, but both are confined to the surface of the volcanoes in the Island, and have been ejected by them from beneath. Even on these sites a strict search is necessary to detect them. I only heard of one piece of the size of two eggs having ever been found.

The 18th compartment shews specimens of a coal or lignite found in the northern parts of Tang-wa circle, and not a mile distant from the beach. It lies a few feet above the level of the watercourse formed between the first and second lines of hills, dipping deeply under the latter, which rise 800 or 1,000 feet above it. Its site is therefore I fear a very bad one; perhaps a matter of no great moment as its qualities I also fear partake of the same character. It is traceable in an east and west direction about 20 yards, the vein, 3 feet and a half thick, is a series of small layers from the 16th part of an inch to 3 inches in thickness, separated by their laminae of ferruginous sand. It has been dug into by the natives, and perhaps two tons of it excavated, from which the specimens shewn were selected. On the spot, I could not make it ignite, it only smouldered.

No. 19, shews a specimen of the Petroleum of the wells of Krae-rone.

As it may not be considered a matter very foreign to the subject under notice, and is inserted in furtherance of the same view, that of, it may be, usefulness to any concerned. I venture to conclude with a slight notice of what I experienced of the climate of Chedooba in traversing it, throughout all parts from the beginning of January to the middle of March, 1841; a period which no doubt constituted, with the previous month of December, the healthiest time on the Arracan Coast, or at least when exposure to weather may best be borne by the European. As is the case in all countries subject to periodical rains, the time of commencement, and taking off of these, will also here be doubtless found the most unhealthy.

But previous to the arrival of the Monsoon, I think that, to all Europeans, exposure to the direct rays of the sun, (often done incautiously or unnecessarily) would be found almost a certain cause of illness, and this more particularly during the months of March, April, and May, when its heat is most violent. But exposure of the above sort must at all times, I think, be deemed highly imprudent, especially when the remedy of a chattah is so easily procured.

This effect may be constitutional and peculiar, but I am inclined to think, that any exercise in the climate of these parts requires for its support good generous food. In the 65th Regiment N. I., while on the coast for nearly two years, mortality from fever among the troops was fearful in amount, among the officers no case of fever occurred. I do attribute the contrast to the difference of living, in which the statement made to me by the Medical Officers and others of that Regiment seems to bear me out, viz., that the troops died from the consequences, more than the fever itself, that in spite of all cordial and strengthening food, and

medicines liberally administered, there was not stamina in their constitution to enable them to rally from the debilitating effects of the disease.

In the course of our duty in surveying along the coast, considerable exposure was necessarily made of the crew of the 'Childers.' On all such occasions it was as much as possible endeavoured to give the people extra food, and quinine was also administered, in fact, throughout the service, every exertion was made to procure as much and as great changes of diet as circumstances would permit. Up to this date, March 24th, twenty-seven cases of fever have occurred; (12th of May, 63) cases on board, all of the same debilitating nature; but, with the exception of one, under peculiar circumstances, which proved fatal, all were recovered, and in general at duty again in 7 days.

I believe that my own experience of the shore climate was far greater than that of any one else among us. But I have reason to be thankful that, though occasionally unwell, I did not suffer from a headache throughout my whole visit.

Next to the two precautions which may be inferred from what has been said, viz. those of keeping from direct exposure to the sun; and a generous—not intemperate—diet. I would mention the necessity of watching and preparing for the great changes of temperature to which the climate is liable; while by day the lightest clothing was too heavy, by night it has been chill under two blankets and a counterpane. An hour before sunset this change takes place, and should always be met by a change to woollen clothing; last, not least, I mention the necessity of keeping a careful watch over the due and regular performance of the digestive functions. Under employment for mind and body, with the above cautions, viz. avoiding undue exposure; good—but temperate living; accommodation to changes of temperature; attention to regularity of digestion, I incline to think that Chedooba, if not Arracan generally, would be found not so fatal a climate to Europeans as has been hitherto supposed.

With regard to the effect of climate on the natives, I would observe firstly, that in the course of their employment for objects connected with the survey, there are few of the able bodied males on the Island whom I had not under personal observation. A small, but well made, active, intelligent race, most cheerful and enduring of fatigue (when obliged to it). In my journeying through the Island, at every village (and few if any were not visited) all ailments were made subjects of application for advice or medicine. These cases amounted to two of fever, one of dropsy, one of paralysis, one of blindness, and one of deformity of limbs. Three cases of fever also occurred among the native (Bengallee) attendants who were with me.

But it may be fair perhaps to increase the apparently small list, by the admission that there exists a disease to a considerable extent, to which the inhabitants of Chedooba are subject, and under which at every village we found perhaps many sufferers, women as well as men, but chiefly the latter; nor in any case though always coming forth to meet us, did it seem to be looked on by either the parties themselves, or their friends as a case on which to apply for commiseration or relief.

'Old age' is very prevalent on the Island, and but few of the villages of Chedooba but can produce more than one, often several, of their inhabitants labouring under the affection of four score years or upwards; many under such burthen, hale, almost vigorous, in mind and body. The party who informed me of the period taken for the clothing of the N. W. plain with verdure, and who had till 15 years old been in the habit of fishing over it, when under the Sea, with his father by name Pallaree, and living in the Inrooma circle, is generally looked on as the senior amongst these 'Appogee' (a respectful term of address to old people). He claimed to have run through 106 years, at which age he walked 12 or 13 miles in order to meet us, and on being disappointed then walked back again (not I believe the same day); when we did meet, it was after a walk of nearly two miles, when he was certainly in body, rather shakey, but after a short rest he recovered himself perfectly. His mind and memory were perfectly sound, as also his hearing, and sight, his speech very slow, but clear and distinct; not a tooth in his head was gone or apparently inclined to depart, and he was not only cheerful, but joking with all around. He ridiculed my not being so old as his great-grandson, who accompanied him, said that he had left off eating animal food but two years since, and when questioned as to what had been his customary food in ages by-gone, answered readily 'any thing even a part of a man if I had wanted it,' a confession which he only modified, to the laughter and remark of the party around, by adding 'if it had been given as medicine,' I know not whether it may be taken as evidence of the existence, to any considerable extent, of another interesting disease in Chedooba, to add that Pallaree, entered into the bonds of matrimony with his last wife 2 years ago.

(Sd.) C. P. HALSTED,
Commander.

*Report on the Soils brought from Chedooba, by H. M. S. 'CHILDERS.'**By the Officiating Curator, Mus. As. Sco.*

The box of Soils and Minerals, brought by Capt. Halsted, having been referred to me for report, I take leave to subjoin the following remarks 'to Captain Halsted's very able notes. He has, most unfortunately, omitted to bring us specimens, of the different *rocks* as well as of the soils. It would have been highly desirable to have had a complete series of these, from the beach lines to the highest point, and in various directions, with as many shells and other organic remains, as could be found, and measurements of elevation; especially those of the 'old beach lines' alluded to by Captain Halsted. Such a series if it can be still obtained, would be of the greatest interest, for we have there an active volcano in the centre of an Island, upheavements going on on the Coast within the memory of man, and coal found; all within the space of a few miles! I need not say how valuable rocks and organic remains would be to illustrate all this.

In the absence of any geological data then my remarks must be mostly agronomical, as regards the soils, and mineralogical in regard to the minerals. I take them in the order in which Captain Halsted has numbered them.

No. 1. Of this little or nothing can be said in addition to Captain Halsted's remarks. The process of natural manuring, to which he alludes is not however, I should think, the sole cause of the fertility of the soils. It will be seen upon close inspection, particularly with a magnifier, that minute particles of carbonaceous matter are dispersed throughout the mass as if they had been originally deposited with the soil, by whatever process this was formed; the one described by Captain Halsted would scarcely we may suppose have distributed it so evenly, but a more extended examination on the spot, could alone entitle us to argue safely on the subject which is one of much importance. No 15, is a soil of the same kind, and it has also some, though a smaller, mixture of carbonaceous matter dispersed through it: both appear to be surface soils only.

No. 2 and 3, are more sandy. No. 3, seems to contain some carbonaceous matter also.

No. 4. Remarkably assimilates to the tea soils of Assam and China, in appearance! and like those of Assam this also occupies the higher spots. As the climate and population of Chedooba probably place tea out

of the question, as a product, I have not thought it worth while, to institute any closer examination.

No. 5. Contains, apparently, a portion of carbonaceous matter.

No. 6. Does not shew any trace of it.

No. 7. Is a very curious soil, if of any extent, on account of its locality in the neighbourhood of the petroleum wells. Captain Halsted does not say if these soils are fertile or barren, which it would be of interest to know; vegetable matter, in the shape of leaves and roots, abound in the specimen. As No. 14, is said to be 'the only barren spot' so that we may suppose this was not wanting in fertility. Nos. 10 and 12, much resemble No. 7. in appearance, though they are not so strongly impregnated with petroleum.

Nos. 8 and 9. As tobacco soils probably owe their superiority to the free peroxide of iron dispersed through them in veins and spots.

No. 11. Is identical with the best Georgian Sea Island cotton soil. I must refer here to my special report on this soil:

No. 13. Is remarkable as being the only soil which offers any sensible proportion of free calcareous matter in the shape of *debris* of shells; and here again we have to regret the want of the rocks, for these would have assisted us in forming a judgment as to whether the soils have been formed from their decomposition, or in horizontal beds and raised up with the Island. We have here a succession of strata through which the volcano may have forced its way without much disturbance? or which may have been raised up so as to shew its edges in overlying beds? Which should then correspond round the volcanic centre; or which may have been formed by the eruptions? All these are curious questions for investigation, and it is to be hoped will not long be left unexamined.

No. 14. 'The only barren spot on the Island' says Capt. Halsted 'being the highest part of the central hill,' I could not on examination detect any saline or acid impregnation in this soil, and I should take its barrenness, in the absence of any gaseous exhalations, which are no where noticed in the report, to be owing to the great quantity of peroxide of iron which it contains, so much indeed that it is almost a red ochre.

No. 15. I have already referred to above.

Minerals.

No. 16. Is sent as iron ore. It is merely composed of masses of amorphous iron pyrites, and wholly useless as an ore of iron.

No. 17. Is also unfortunately not copper ore, but cubical iron pyrites, containing no trace of copper, and quite valueless, unless it be abundant enough to smelt for its sulphur where fuel and labour are cheap. The mass of silver ore alluded to by Capt. H. was probably a lump of the white kind of pyrites.

The coal I should think promises well, judging from these specimens at the out-crop of a seam. It is bituminous, though not highly so, and I found also its Sp. Grav: to be 1.31, which is that of the best Burdwan coal. Its appearance and the fracture of some of the specimens are also in its favour, but any opinion would be premature till we have samples from a greater depth.

The petroleum does not call for any remark.

H. PIDDINGTON.

Illustrations of the Genera of the Bovinæ.—Part I. Skeletons of Bos, Bibos and Bison, the individuals examined being the Common Bull of Nepal, the Gowri Gao of Nepal and the Yak.

Bos and Bibos, resemble one another in the general formation of the trunk, and in having each 13 pairs of ribs, and 6 Lumbar vertebræ. In both, the ribs, from the 5th pair inclusive, bulge outwards gradually to the 13th which are the farthest apart. In Bisonus, on the contrary, all the ribs are much straighter; the first 6 pairs diverging very little more from the perpendicular than in a horse; from the 7th to the 10th pair inclusive, the bulging is greatest; the latter pair being the farthest apart, whence to the 14th they rather approximate, the last pair being nearer one another than the intermediate ones. This gives a cervine character to the trunk of Bisonus. In Bisonus 14 pairs of ribs, and only 5 Lumbar Vertebræ, making an equal number of Vertebræ, in all 3 animals.

The differences between Bos and Bibos, are as follows. The spinous process of the Dorsal Vertebræ in Bibos from the 3d to the 5th inclusive are of equal length, with a very gradual shortening of the others to the 10th which is 2 inches longer than the 11th, and the 12th is two inches shorter than the 11th. The droop towards the loins from the greatly elevated spinal crest of Bibos is so sudden, that in one specimen in which the spinous process of the 10th vertebra measured $10\frac{1}{2}$ inches, that of the 13th was only 5 inches. In Bos, the 3d spinous process is the longest whence the droop commences, the dorsal spines gradually shortening until the 10th, whence to the 13th they are not longer than those of the

Lumbar vertebræ. The Humerus in Bos, compared with the fore arm is somewhat shorter than in Bibos. The carpus and canon united, compared with the fore arm is shorter in Bibos than in Bos.

The following comparative peculiarities in all these animals present themselves:—

The skull and horns are greatly heavier in Bibos than in Bos or Bisonus. The forehead of Bibos is at first sight hollow, but is actually flat; the concave appearance being derived from a great transverse arch of bone which surmounts the face; projecting forwards in some degree, but its direction taken along the convexity parallel with the centre of the horns' cores. The orbit in Bibos projects more than in Bos, or Bisonus: the nasal bones are *most* arched (transversely) in Bibos, *least* so in Bos. The face—from anterior margin of orbits to muzzle—*longest* in Bisonus, about *equal* in Bos and Bibos. In Bisonus the forehead above the orbits, is transversely arched, in Bos it is quite flat. In Bos, placing the muzzle on the ground, the parieto-frontal junction is flush with the superior aspect of roots of the horns' cores. In Bisonus, placing the skull similarly—the superior portion of the frontal bones is, for about an inch and a half on each side, on a line with superior aspect of roots of horn cores; the medial portions and frontals are considerably elevated, forming a central truncated cone between the two portions already noted as being on a line with superior aspect of root of horn cores. In Bibos again, the skull disposed as above, a large bony arch protruding so as to overhang the forehead runs across from horn to horn, the arch commencing at once from their roots. Viewing the three skulls from the superior margin of the intercornual space, (skulls placed as before with muzzles on the ground) to the foramina magna, the following differences appear so remarkable in Bibos, as to be alone eminently fitted for at once distinguishing it from the others. In Bos, the entire space from the superior margin of the foramen magnum, to the intercornual crest of the frontals, is occupied by the insertions of the nuchal muscles, and it is nearly square (trapezium.) In Bisonus, the same space is an equilateral triangle, and divided into two separate parts. 1st. The truly occipital portion, into the whole of which the nuchal muscles are inserted, formed *anteriorly* (the muzzle on the ground) by a slightly arched line drawn between the posterior margins of the bases of the horn cores; and *posteriorly* by the superior margin of the foramen magnum. 2nd. The parieto-frontal portion, of a triangular shape, free from muscular insertions, only $\frac{1}{4}$ th the extent of the 1st portion, and forming the apex of the larger triangle.

In Bibos, the same space (or postcal aspect of the skull) is of a spheroidal shape, deeply indented about its centre by the temporal fossæ, thus dividing it into two nearly equal hemispherical portions, viz., the anterior and larger one formed entirely by the great intercornual crest, and free from the insertions of nuchal muscles and ligaments, and the posterior or truly occipital portion, occupied wholly by the insertions of the neck muscles. The size of the intercornual crest in Bibos is so great that the postcal aspect of the skull equals in extent the anterior one, bounding the latter inferiorly by a line drawn across the face from the centre of the orbits. Leaving the skulls, the following are the comparative differences in the trunk of these three animals.

The great development both in elevation and extent of the spinous ridge in Bibos, at once distinguishes this animal from Bos and Bisonus. In Bos the greatest elevation, much inferior in height, is confined to the spinous process of one vertebra (the 3rd) whence the declension is uniform to the 10th. In Bibos the extreme elevation is extended to three of the spinous processes (the 3rd, 4th and 5th), and considerable elevation prolonged to the 11th. In Bisonus again, which occupies a middle station between Bos and Bibos in regard to *extensive* development of the spines, the extreme elevation, great in height as compared with Bos, is confined to one spine, whence the declension is more sudden than in Bibos, but less so than in Bos. These differences in the skeletons are manifested in the living animal thus: in Bos the rise from the neck to the greatest elevation of the spinous processes is most gradual, the highest point being between the scapula, with declension thence gradual and uniform. In Bibos the rise from the neck is more abrupt than in Bos, and the declension very gradual until near the loins (at 10th Vertebra), whence to level of loins very sudden indeed, giving the animal an appearance of disproportioned smallness in its hinder extremities. In Bisonus the rise from the neck is most abrupt, and confined as in Bos to the shoulders, or rather entirely to the withers, whence the droop is more gradual and uniform than in Bibos, but less so than in Bos.

In detail these appearances arise from the following state of spinous process. In Bos the first spinous process is only 2-3ds the length of the 2nd. In Bibos the 1st spine is to 2nd as 7 to 8. In Bisonus the 1st spine (dorsal) is of extraordinary length and only perceptibly shorter than 2nd one, which is the longest of all, whereas in Bos and Bibos the 3rd is the longest.

Summary of Osteological Characters as noted above.

Bos.—Dorsal Vertebrae and Ribs 13; Lumbar Vertebrae 6; Ribs laterally bulging from the sixth pair giving great expansion of costal region;

transverse processes of Lumbar Vertebrae long and strong, spinous process of this not specially developed: the 3rd Dorsal Vertebra the longest, whence a gradual and uniform shortening of spinous processes to 10th, which is not longer than those of Lumbar, Metacarpal bone (Canon) long, ditto Metatarsus, forehead flat, nasal bones obtusely arched; facial portion of skull (all below the orbits) longer than in Bibos, shorter than in Bisonus, or Bubalus, in which longest of all. Intercornual space scarcely arched; skull less massive than in Bibos, more so than in Bisonus; Postcal aspect of skull square and smaller compared to forehead (all above orbits) than in Bisonus, greatly so than in Bibos.

Bibos.—Skull deep, broad, and very massive, an elevated massive and protruding intercornual crest, overhanging the forehead nasal bones, longitudinally arched (especially in the male), giving along with the protruding intercornual crest, a hollow appearance to the forehead. Postcal aspect of skull as extensive as the forehead. Horns of great thickness, short and invested over their intermediate crest. Ribs and Dorsal Vertebrae 13; Lumbar 6; lateral processes of Lumbar, less developed than in Bos, more so than in Bisonus. Ribs laterally bulging as in Bos—if any difference less so. Metacarpus (Canon bone) and Metatarsus shorter than in Bos, longer than in Bisonus. Spinous ridge greatly developed both in altitude and in extent—the processes continuing of great length to the 11th. They exceed those in Bos, even in a greater degree, than the massiveness of skull and horns would indicate.

Bisonus.—Dorsal Vertebrae and Ribs 14—Lumbar 5—Ribs straight, and costal cavity compressed and cervine compared with Bos and Bibos. Spinous ridge greatly developed anteriorly, but less protracted in extent and declining (from 3d spinous process) more abruptly than in Bibos. Skull less massive than in Bos or Bibos, facial portion longer and more finely tapering. Superior portion of forehead transversely arched. Intercornual space centrally elevated, viewed anteriorly, this portion is a truncated cone, postcal aspect of skull triangular, more extensive than in Bos, but greatly less so than in Bibos. Metatarsus and Metacarpus, shorter than in Bibos or Bos.

Remarks.—The character of the limbs in Bos, indicate the greatest degree of locomotive speed, and the developement of the Lumbar region, promises the greatest burden-bearing power. The cervine character of costal region in Bisonus may, in locomotive energy compensate the longer canon bone, and Metatarsus of Bos, nor is it improbable, that the additional pair of ribs in the same animal, by adding to his length of barrel and shortness of loins, may compensate to him the greater indications of strength in the Lumbar region of Bos.

P. S.—Since writing the above I have seen the skulls of a male and female Gayal from Sylhet. The face is flat, the intercornual space is flush as in Bos; the horns are somewhat triangular at their base, tapering to a sharp point, dark green, about $4\frac{1}{2}$ feet apart at the apices, and laterally diverging from their base. The Gayal, Mr. Hodgson informs me, has 13 Ribs: its head it indisputably Bovine, much more so than in Bibos.

A. C.*

Part II. Craniology of Bibos, Bison and Bubalus, the subjects of examination being the Gouri Gao, the Gayal, the Yak and the Arna.

Adverting to the annexed table of admeasurements, I proceed to remark upon the several skulls:

Dimensions and weight of the skulls and horns of Bibos Cavifrons (1), Bos Garvus (2), Bisonus Poepagus or the Yak (3), and Bubalus Arna (4), Common Domestic Bull of Mepal (5), 6, 7 fem of 1 and 2.

	1.	2.	3.	4.	5.	6.	7.
Length from Symph: intermax: to crown of forehead,	1 10 $\frac{1}{2}$	1 7 $\frac{1}{2}$	1 7 0	1 11 $\frac{1}{2}$	1 5 0	1 8 $\frac{1}{2}$	0 5 $\frac{1}{2}$
Greatest height,	1 3 $\frac{1}{2}$	1 1 0	0 9 $\frac{1}{2}$	1 2 0	0 9 $\frac{1}{2}$	1 0 $\frac{1}{2}$	1 0 0
Greatest width of frontals between the orbits,	0 11 0	0 10 0	0 9 0	0 8 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 8 $\frac{1}{2}$
Least ditto ditto,	0 8 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 7 0	0 6 0	0 6 $\frac{1}{2}$	0 6 $\frac{1}{2}$	0 6 $\frac{1}{2}$
Greatest width of frontals, between antea and inferior bases of horns,	1 2 0	1 1 $\frac{1}{2}$	0 10 0	0 10 0	0 7 $\frac{1}{2}$	0 11 $\frac{1}{2}$	0 1 0
Height or length of postea plane of skull from lower edge of foram: condyles to crest of forehead,	0 11 0	0 8 0	0 6 0	0 8 0	0 5 $\frac{1}{2}$	less 0 9 0	less 0 7 0
Length of frontals from line drawn through mid orbits to crest of forehead,	0 9 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 6 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 6 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 7 $\frac{1}{2}$
Length of Nasals,	0 10 0	0 6 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 10 $\frac{1}{2}$	0 7 0	0 8 $\frac{1}{2}$	0 5 $\frac{1}{2}$
Greatest breadth at Muzzle (intermaxill:),	0 4 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 4 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 3 $\frac{1}{2}$	0 3 $\frac{1}{2}$
Diameter of orbits,	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$	0 2 $\frac{1}{2}$
Symphysis of intermaxill: to inferior edge of the orbits,	0 11 $\frac{1}{2}$	0 10 0	1 0 0	1 2 0	0 10 0	0 11 0	0 9 $\frac{1}{2}$
Thence to bases of horn,	0 6 0	0 5 $\frac{1}{2}$	0 4 $\frac{1}{2}$	0 5 0	0 5 $\frac{1}{2}$	0 6 $\frac{1}{2}$	0 5 $\frac{1}{2}$
Basal circuit of the horns,	1 6 $\frac{1}{2}$	1 5 0	0 10 $\frac{1}{2}$	1 7 0	0 8 $\frac{1}{2}$	1 1 0	1 1 0
Terminal interval of horns,	1 8 0	2 10 $\frac{1}{2}$	1 3 $\frac{1}{2}$	1 9 0	1 7 0	0 8 0	1 9 0
Greatest interval of ditto,	2 1 $\frac{1}{2}$	2 10 $\frac{1}{2}$	1 7 0	3 0 0	1 7 0	1 3 $\frac{1}{2}$	1 9 0
Length of horns greatest by outer curve,	1 10 0	1 8 0	1 5 0	4 4 0	0 9 $\frac{1}{2}$	1 5 0	1 3 0
Weight of skulls and horns,	30 lbs. 8 oz.	17 8 0	15 8 0	27 0 0	9 $\frac{1}{2}$ lbs.	15 $\frac{1}{2}$ lbs.	10 $\frac{1}{2}$ lbs.
Length of face from Symph: intermaxill: to lower edge of orbits,	0 11 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 11 $\frac{1}{2}$	1 2 $\frac{1}{2}$	0 10 0	0 0 0	0 0 0
Length of forehead from lower edge of orbits to crown of frontals,	0 11 $\frac{1}{2}$	0 9 0	0 7 $\frac{1}{2}$	0 9 $\frac{1}{2}$	0 8 0	0 0 0	0 0 0

* These initials indicate the work of Dr. Campbell of Darjeeling, formerly my assistant, and who was kind enough to afford me his aid on this, as on various other occasions.

The prime characteristics of No. 1, or the skull of the Gouri, are enormous size, (above a third greater than that of the ox); more than proportionate massiveness or weight (being treble that of the ox); and lastly, great breadth, without marked deficiency of correspondent height or length. The greatest width of the frontals, between the extreme bases of the horns, is to the length as 14 to $9\frac{1}{2}$; but the greatest width between the extreme margins of the orbits is to the length only as 11 to $9\frac{3}{4}$. At first sight the frontals, *exclusive of their crest*, look flat; but they are really somewhat concave, and that, as well across between the very salient orbits, as longitudinally between the arched nasals, and the commencement of their own crest. That crest is most remarkable: it occupies the whole breadth of the bases of the horns and ascends nearly 2 inches above them, in a bold transverse arch. From the plane of the forehead it rises with a slight declination backwards, has a round edge on the crest, and thence falls perpendicularly upon the parallel plane of the occiput of which it constitutes (with the entirely merged parietes) above one half. The postcal plate of the skull thus becomes of an extreme size, being in depth to the lower edge of the condyles of the great foramen, longer or deeper, than the antecal plane of the frontals, great as the latter is. Another feature of the postcal plane is the very deep indentation of the temporal fossæ, which cut half in two the superior, pseudo-occipital or cristate, and the inferior or truly occipital portions of the postcal plane.

Of the trigonal ridge, which, in the Bisons, bounds superiorly the parietals, there is no trace, and very little of the true transverse ridge of the occiput which commonly limits the parietes inferiorly. With regard to shape, the occipital plane is neither square or semi-circular, but rather! if you *exclude* the interruption made by the temporal fossæ, spheroidal between the incurved salient alæ of the condyles below, and the bold transverse arcuation of the crest above; and if you *include* that interruption, bi-elliptic or composed of two oblate rounded figures of an ovoid or elliptical outline, and lying, one above the other, transversely to the skull, the upper or pseudo-occipital portion being the larger. The facial portion of the skull is equal in length to the frontal portion: the orbits are very salient and cervine, with rapid contraction of the head's breadth before them towards the nasals, which are of ample length and exhibit an arched form both lengthwise and across. The breadth of the intermaxillaries is moderate, in the position of the muzzle, which in the living animal is small; and though the nasals are produced much to the front, yet the lateral solution of continuity in the bones towards the malars

(the intermaxillaries not reaching the bones of the nose at all) is ample; and this, with the convexity of those bones, leaves abundant space for the olfactory apparatus. Other peculiarities of this skull, are, that the rami of the lower jaws are but slightly bent in comparison to those of *Bos*; and that their condyles as well as those of the foramen magnum have a lower than ordinary position. The horns, of very moderate length, and gradually attenuated from a very thick base, occupy the extreme ends of the frontal crest, filling its breadth but not ascending within two inches of its greatest height. Their direction is towards the sides with a slight uniform ascending and retiring curve, which brings the points back about half way to the bases with a direction suited to their junction over the neck, though, in males especially, the distance between the points always remains great. The horns are upon the whole rounded, but with considerable oblique depression towards the massive bases, so that their breadth is greater by $\frac{1}{3}$ than their depth, and the anterior surface sharper or narrower than the posterior one, the greatest surfaces being (in a horizontal position of the skull) towards the zenith and nadir. The result is a subtrigonal or ovoid section at the base, where in old animals there are externally several heavy wrinkles: the colour is horn green with black tips.

No. 2, which is the half reclaimed stock of *Gavæus* vel *Bos sylhetanus*, is likewise a large skull, not above a 6th less than the preceding in dimensions of extent, but scarcely exceeding half of the weight of it, the bones being far less massive and also smooth on the surface. Here again we have signal length and breadth in the frontal region, both rapidly diminishing in the relatively contracted facial, so that the distance between the small fine muzzle and the eyes exceeds not that between the latter point and the summit of the head. In the precedent skull, the same proportion was observed. But in the profile of the present there are none of the curved lines, so noticeable in the last —no frontal crest, no saliency in the orbits, and no arcuation in the length of the nasals, which are, besides, as well comparatively as positively short, whence the interval, between their points, and those of the intermaxillaries is much greater than in the last; though, as in it, these bones are entirely disconnected by the intervention of the malars. The greatest width of the frontals, at the two points before indicated, is to their length as 13 and 10 to $8\frac{1}{2}$. These are dimensions and proportions pretty similar to the last, and exhibit a comparative breadth not found in the common types of *Bos*, with which however the present skull agrees in the perfect flatness and rectilinearity of its frontals,

owing to the non-saliency of the orbits and to the straightness of the culmenal line drawn between the bases of the horns. There is a further essential agreement with *Bos* and disagreement with the last, in the circumstance of the horns being inserted on the summit of the frontals, which however, as in the last are carried high up between the horns and thence dropt perpendicularly upon the parallel plane of the occiput, of which they constitute with the entirely merged parietes, not indeed a half as in *Bos*, but a very material portion, almost $\frac{2}{3}$ th. The postcal plane of the skull is consequently of dimensions inferior only to those of the last but superior to those of the occipital surface in *Bos* or *Bubalus* or *Bisonus*. In the present subject its depth or length is not far from equal to that of the frontal plane, large as the latter is; and as in the last temporal fossæ make a deep indentation upon it, though not so deep as in *Bibos* nor so centrally placed in respect to the height or depth of the plane. This indentation in both skulls marks by its position the extent of the false and true portions of the occipital plane, or that composed of the frontals and the parietals, and that composed of the occipital bones inclusive of those of the foramen and its condyles. In *Bibos* the former portion is equal, and more than equal to the latter, and the indentation is consequently central; in the present animal the proportions of the two parts are as 2 to 3 and consequently the indentation is supercentral. This indentation likewise, as already noted is much less deeply cut, though more so than in the more ordinary types of *Bos*; in which latter, however, the false occiput, so characteristic of these 2 skulls (*Gouri* and *Gayal*), cannot be said to exist; nor is there in *Bos* proper any sign of the trigonal ridge defining the course of the parietes *superiorly* in the *Bisons* and in them only. The transverse ridge bounding the parietes *inferiorly* is defined in this skull (*Gayal*) about as distinctly as in *Bibos* and in *Bos*. In point of shape the postcal plane of the present subject represents in its upper portion a vague transversely laid parallelogram, and in its lower, an oblate sphere—of which two the proportionate size has been already stated as 2 to 3. But, if we take no heed of the indentation of the temporal fossæ and moreover consider (as *Cuvier* always does) the *base* of the plane as *rectilinear*, the figure of the plane may be called square. In the common *Ox* this indentation is *really* almost obsolete: but in both *Ox* and *Yak*, as in the *Bibos* also, the basal line is arched downwards. The culmenal line is arched, (upwards) only in the *Gouri* or *Bibos* and in the *Bisonine Yak*. The angle formed by the postcal with the antecal plane of the skull of the *Gayal* is very acute and in fact a right angle as in *Bos* and *Bibos*. The non-saliency of the

orbits and the straightness, longitudinally viewed, of the nasals, have been already noticed. In these respects, as in the lesser compression of the lachrymal and malar bones, the present skull agrees with that of the common Ox; but the intermaxillaries are narrower at their extremity, and the nasal bones are shorter in proportion to them, and to all the other dimensions indeed, than in the common Ox. In the narrowness of the muzzle (intermax:) there is a point of affinity with Bibos: and with regard to the bend of the rami of the lower jaws and to the position (high or low) of their condyles, as well as those of the foramen magnum, the skull exhibits a mixed character composed half of Bibos and of Bos. Duvancel erroneously I think stated, to Cuvier that the Gayal species in the wild state have no proper dorsal ridge. Dr. Buchanon, however, asserted, of the reclaimed race, that the true ridge is present but short in extent, not extending over more than a third of the back. I cannot decide that essential point: but I know that the Cayal has only 13 pairs of ribs; and from the characters of the skull, I deduce a confirmation of H. Smith's opinion that the animal is an osculent species, as I should say of Bos or of Bibos according as it has, or has not the true dorsal ridge. The horns are placed at the ends of the highest part of the frontals, a large portion of which on both surfaces of the skull they cover or flank rather with their thick bases. Towards the bases they exhibit several wrinkles, but are smooth upwards and rapidly attenuated to the blunt points; as in Bibos the horns are subtrigonal and depressed the broadest faces (in the horizontal position of the head) being the superior and inferior, the next so, the postæal, and least broad, the antæal. The depression is even more distinct than in Bibos, but still the section is, upon the whole, ovoid. The horns are directed outwards with a slight inclination backward and upward, and hardly any curvature so that their divergency is exteme. The colour is wholly black, and this as well as the very moderate curve of the horns, and their position upon the summit of the perfectly flat frontals, may be used as decisive criteria to distinguish the spoils from those of Bibos or No. 1. In the females of Bibos the frontal crest, though less conspicuous than in the males, is ever present, and may be marked at once by the arched line passing between the *highest* bases of the horns, which it transcends in the middle—and by the depression of the frontals between their *lowest* bases. The skulls too of Govæus are from a half to a third smaller, taking weight and dimensions together. In the females of Bibos the horns are so much bent that the tips are as near as the bases, and pointed directly at each other just behind the nape. I proceed now to No. 3 or the Chowry Bull of Tibet which has 14 pairs of ribs and a strong dorsal ridge, though

limited in extent to the withers ; and which is therefore justly considered to belong to the Bisontine group, though it be perhaps an aberrant or osculant species more connected by some of the characters of its skull with the Bubalines than with the Taurines. The distinctive characters of this skull are moderate size and weight, dimensions of length more preponderant (from increase in the facial region) over those of breadth, and more specially of height, than in either of the foregone or even in the common Ox ; and, lastly, frontals distinctly though trivially convex in the upper part, whence they pass with a somewhat obtuse angle into a semi-circular or rather trigonal occipital plane of very moderate size. The excess in length of the facial over the frontal portion of the skull is as 11 to 7. The greatest width of the frontals at the two points before named is to their length as 10 and 9 respectively to $6\frac{1}{2}$: but as, owing to the higher position of the orbits, the nasals do not really extend upwards beyond a line drawn across *anteal* the edge of the orbits, the proper proportion of length to breadth of frontals is really about $7\frac{1}{2}$ to $9\frac{1}{2}$. This is an excess of proportionate width by no means exceeding that of the preceding examples, nay rather falling short of their proportionate breadth. It, however, exceeds the proportion in the common Ox, whose frontals, measured in the way just suggested and for the same reasons, are only as broad as long, and that equally whether we take the breadth between the orbits or between the bases of the horns. At first sight the frontals seem flat, owing to the elevation of the orbits ; but they are effectually, and especially in the upper part, arched, as well across as longwise, so as to lessen the angle made with the occipital plane which is of moderate size, and composed entirely of the true occipital and parietal bones. These bones, delimited by a continuous ridge, whose apex constitutes at once the summit of the frontal crest and of the occipital plane, constitute the latter a right angled triangle, defined laterally (below the parietals) by the temporal fossæ and lambdoid crest, and basally by an imaginary straight line drawn transversely through the condyles of the foramen magnum. The indentation of the temporal fossæ upon the occipital plane, though larger than in the domestic Ox, is far less than in either of the preceding species ; and, as it is drawn much upwards close under the horns, the occipital trigon is uninterrupted ; as, for a similar reason, is the occipital *square* of the Ox, whose parietes, however, are merged, as in the Gauri and Gayal, though placed as high as in the Yak. Owing to this merging and to the absence of transverse arcuration in the frontal ridge line, the occipital plane in the Ox becomes square ; whereas, owing to the boldly defined and pointed parietal ridge, and to the rounding off of

the frontals on either side of it, the same plane in the Yak becomes trigonal—or where the parietal ridge is more obscure and the rounded off and transversely arched ridge line of the frontals is made to define the occipital plane superiorly—semicircular; the *base* being *always* considered a *straight* line. There is a strong tendency, no doubt towards the Bubaline skull in the Yak, and not merely in the round and sloped off frontals as as above noticed, but also in the great extent of the facial portion of the skull, and in the very small curve of the rami of the lower jaw. Towards Bibos again there is an inclination in the transverse intercornual arch though it be vague, in the salient orbits, and in the longitudinal arcuation of the nasals, as well as in the large lateral vacuity towards the molars. The intermaxillaries cease considerably short of the nasals and the two sets of bones are consequently wholly unconnected, more so even than in the Gouri or Gayal. The nasals are no way deficient in length; yet is the interval between their anteaal extremities and those of the intermaxillaries more signal than in the Gouri, the Gayal, or even the Arna in which last the nasals are at a maximum of developement so as to be connected with the intermaxillaries for a considerable extent—a circumstance sometimes observable to a less extent in the skulls of the common Ox. In the living Bison or Yak the muzzle is small as in Bibos, but I cannot say I clearly trace the symptoms of this in any unusually narrowness of the intermaxillaries at their symphysis. Upon the whole the skull of the Yak as compared with that of the common Ox, is larger in proportion to the size of the animals, and exceeds the Bovine skull as much in breadth as it falls short of it in depth or height. These are characters of *depression* and are no where else so noticeable as in Bibos (excluding the crest) whence the skulls of both come further to agree in the common inclination towards straight lower jaws lowly articulated. But in the length of the facial portion of the skull as compared to the frontal and consequent high position of the orbits, and in the tendency of the rounded frontals to slope off easily towards the occipital plane, the Yak's skull differs antipodally from that of Bibos, approaching in the same degree to the Bubaline cranium. Of all the skulls now before us the position of the orbits is highest (longitudinally viewed) in the Arna or wild buffalæ, and lowest in the wild Gouri or Bibos; in the Yak its position is most analogous to that it holds in the common Ox. In regard to saliency of the orbits, there is the strongest resemblance between the Bison and Bibos—none of the others showing the least tendency that way. The horns of the yak, of moderate size, jetty black, rounded and smooth occupy, as usual, the ends of the frontal

apex having the frontal bones somewhat arched between them as well transversedly as lengthwise, though the evenness of the arcuation both ways be somewhat broken by the saliency of the apex of the parietes, which apex shows itself palpably on the central point of the crown of the forehead sometimes rising a little above and in rear of the cases of the horns. The horns are directed at first outwards, and then reverted upwards and backwards with a bold curve, which often leaves the points not remoter than the bases, in which case the points will tend towards the crown of the withers, or if less curved, directly backwards and parallelly.

I proceed now to No. 4 or the Bubaline skull, the most signal characters of which are elongation or preponderance of length over both width and depth, the very large proportion of that length borne by the facial portion in comparison of the frontal or cerebral, and the easy rounded slope by which the clearly convex frontals pass into the occipital plane. In regard however to the last named characters there is considerable diversity of degree found in different skulls, those which have the horns directed most backwards from and at their bases being most signal for the confluent rotundity of the frontals and parietals (in some almost as noticeable as in our own heads) and those which have the horns directly least backwards, being least so. Massiveness and size are no doubt further characteristics of the Bubaline skull; but characters in which it will bear no comparison, at least in regard to weight with that of Bibos, though the vast size of the Arna's horns will sometimes approximate the weight of both skull and horns to that of the skull and horns of Bibos. The Arna or type of Bubalus has 13 pair of ribs and no trace of the dorsal ridge of Bibos and of Bison, the ridge line being perfectly straight in the living animal from the nape to the root of the tail. The Arna is one third larger than the finest domestic breeds of buffaloe, and, like the wild type of Bibos, is distinguished for a short tail reaching only to the hocks. The limbs are much less fine than in the other Bovines, the body longer in proportion to its height, and the habits quite different, leading the animals perpetually to wallow in mud and water. Mais revenons a nos ossements. The length of the facial portion of the skull compared with that of the frontal is as 15 to 10 nearly. The greatest width of the frontals at the two points before indicated is to their length as 10 and $8\frac{1}{2}$ respectively to $7\frac{1}{2}$. The frontals in fact are both short and narrow, and they are invariably more or less, and generally markedly, convex, as well transversely between the unsalient orbits as lengthwise from behind the orbits to the occiput. The

more arched the forehead the obtuser the angle formed with the occipital plane and the more distinctly do a portion of the frontals and all the parietal go to from a part of that plane. In such cases the pseudo-occipital portion of the postcal plane is very noticeable constituting nearly one half of its whole depth and representing a transverse ovoid figure or oblate spheroid bounded above by the vaguely defined crown of the frontals, and below by the rather deep indentations of the temporal fossæ connected by any imaginary line. But usually, and whenever the frontals are not very much curved in their length, the pseudo-occipital portion of the postcal plane of the skull is trivial in depth, and defined above by a nearly straight line between the ends of the horns—the rest of the postcal plane constituting a second and less depressed sphere, defined above by the course of the true occipital ridge, and nearly excluding the parietal trigon so strongly marked in the last or the Bison of Tibet, but here wholly unmarked, the bone itself being utterly merged in the frontals.

In point of size the postcal plane of the skull, though moderate on the whole, is yet usually larger than in the Ox or in the Yak, but far inferior in extent to what is seen in Bibos—most nearly resembling the proportion and figure too in the Gayal. The nasals, molars and intermaxillaries are extremely developed longitudinally, so that the orbits are nearly twice as far from the symphysis intermaxill. as from the crown of the frontals. These bones have no proportionate breadth so that the face is narrow as well as long, except at the symphysis of the intermaxillaries where the dilation of the bones clearly indicates the broad massive muzzle of the live animal. The intermaxillaries intervene between the molars and nasals for 2 to 3 inches: the nasals are not at all arched and are well produced to the front so that the nasal cavity is upon the whole small, though somewhat increased by the lateral dilatation of the intermaxillaries in the region of the muzzle. The deficient width of the skull is indicated by the close position of the rami of the lower jaw, and its moderate height or depth, by their small curvature, though in the last particulars of deficient depth and consequent straightness of the lower jaws, the Yak's skull is pre-eminent. The horns of the Arna are signally remarkable for size, for horizontality, and for depression: their thickness is not so remarkable as their length and their tendency backwards parallelly to the plane of the face with bold lateral single curves (to the sides neither sinking nor rising) and more or less of divergency. Their length is sometimes enormous and there is a clear distinction between the breeds with the longer and less divergent, and

those with the shorter and more divergent horns. The horns are inserted typically at the ends of the frontal line which usually lies evenly between them, but is sometimes arched. They are so much depressed that the width is more than double of the depth, and the depression being at the same time oblique, the outer or anteal side presents a considerable flat surface, while the inner or posteaal one shows an edge only. The horns are therefore strictly triangular and that invariably so, 4 or 5 inches only at the points being rounded, and there only the horns are smooth, the rest of the surface being covered with close transverse wrinkles or rugae.

With regard to the skulls of the domestic Ox and those of the females of the Gouri and the Gayal, I will not fatigue the reader by any separate remarks on them. They have been sufficiently mentioned incidentally.

General dimensions, aspect and external characters of the Gouri Gao, the Arna and the Yak.

(1) Gouri Gao, (2) Arna or wild Buffaloe.

	(1)	(2)
Nape to root tail, straight.....	7 6 $\frac{1}{2}$	7 9 0
Height at shoulder ditto.....	5 8 0	5 4 $\frac{1}{2}$
Ditto at croup ditto.....	5 0 0	5 5 $\frac{3}{4}$
Depth of chest ditto.....	3 1 $\frac{1}{2}$	3 0 $\frac{1}{2}$
Girth behind shoulder	8 7 0	8 6 0
Fore leg to line of Chest	2 3 0	2 4 0
Tail only	2 7 $\frac{1}{2}$	2 9 0
Tail and tuft	2 9 0	2 11 0
Head, length from nape to snout along the curve	} 2 10 $\frac{1}{2}$	2 8 $\frac{1}{2}$
Diito straight, snout to crown forehead.	1 10 $\frac{1}{2}$	1 10 $\frac{1}{2}$
Ditto ditto Snout to fore angle of eye..	1 0 0	1 2 0
Thence to nearest base of horn	0 5 $\frac{3}{4}$	0 4 $\frac{1}{2}$
Depth of head, greatest from crest of forehead to edge jaw.....	} 1 4 $\frac{1}{2}$	1 1 0
Breadth of forehead, greatest above or- bits.....	} 0 11 $\frac{3}{8}$	0 9 $\frac{3}{8}$
Length of ditto from line of upper edge of orbits to crest of head	} 0 11 $\frac{1}{2}$	0 8 $\frac{1}{2}$
Length of ears.....	0 10 $\frac{1}{2}$	0 11 $\frac{1}{2}$
Greatest width of.....	0 6 $\frac{1}{2}$	0 0 0
Length of fore hoof	0 6 0	0 7 $\frac{1}{4}$
Greatest breadth of ditto.....	0 4 $\frac{3}{4}$	0 7 0

Length of hind hoof.....	0	5	0	0	6	$\frac{3}{4}$
Greatest breadth of ditto.....	0	4	0	0	5	$\frac{3}{4}$
Horns length outside curoge....	1	9	0	4	6	0
Terminal interval of tips.....	1	9	0	1	9	$\frac{1}{2}$
Nearest basal interval postea.....	0	7	0	ant	—	6 0
Remotest basal interval antea.....	1	1	$\frac{1}{2}$	post	1	0 0
Weight of skull and horns.....	32	lbs		30	lbs.	
Girth of horns at base.....	1	6	$\frac{1}{2}$	1	8	0

Character of the heads with their integuments.

GOURI GAU. The head is large and massive with great breadth and depth rapidly diminishing towards the gape where the ample lips and muzzle cause it to swell again : the straightness of facial line is slightly interrupted by the arcuation of the chaffron, even before you reach that light point where the frontals commence to make their huge curved sweep towards the occiput. The crest of this sweep is about $1\frac{1}{2}$ inch above the horns ; its antea base $5\frac{1}{2}$, and its postea, $2\frac{1}{2}$ above the proximate planes, fore and aft. Its form is almost cylindric between the bases of the horns which occupy its ends entirely, and pass behind it on the dorsal surface ; muzzle of small size for a taurine animal and somewhat indented curvately on superior edge instead of running straight across between tops of nares ; nares broad, lunate and oblique : upper lip full, laxly applied to head, and falling over lower lip which has a small beard : both lips near the gape have large soft pointed and recurved papillæ. The 8 incisors below, which are ranged in a small arch with broad nearly level crowns, are quite moveable in the gums : the chaffron is of medial length and boldly convexed lengthwise and across : the forehead is long, broad and flat, till the arched sweep between the horns commences at 7 inches from the extreme antea base of forehead or a line drawn across the *antea* points of orbits : From *this* line to the crest of forehead there is a length exactly equal to the greatest breadth between the orbits, which is at their postea salient angles. From the great length and bread of forehead result the low position and great separation of the eyes. The interval between them across the top of the chaffron is one foot by the natural curve ; and the distance from their anterior canthurs to the nearest base of the horn is $5\frac{1}{2}$ inches. In the Arna the same interval is but $8\frac{1}{2}$; and the same distance, but 3. The ears are of ample size and spread greatly towards the tips, the shape being somewhat ovoid ; from anterior edge of helix proceed some long hairs, and the lower margin is indented by short striæ of closer hairs which run all round its edge :

the rest of the interior is nude ; the auditory orifice is at the very bottom of the ears, small and round, and protected on the anteal side by a process equivalent to the tragus, but wholly internal above this a short transverse bilobate process defining the upper line of the small and vague concha, and having a deep inclination above it answering to the lower ridge of the antihelix and scapha respectively.

The eyes are rather small, oblique, full with oblong oblique pupil and large soft lashes to upper lid. The horns are very remote, short thick, directed nearly outwards and a little backwards with the tips recurved inwards and backwards. They have a very broad base passing gradually into skin and postally secreting and nude. They are depressed and subtriangular, the broadest faces being the superior and inferior, and the third of the triangle, the postal face: the anteal is reduced to an obtusely rounded edge merely: the trigonal form gradually gives way upwards, and the recurves are conic, ending in a sharp point: two or three heavy rugæ near base: rest of horn very smooth and glossy: colour pale green with black points. As already noted, the horns lie $1\frac{1}{2}$ inch below the crest of the forehead; but a portion of their base passes a good way *behind* that crest, which ends on the occipital surface of the head in a small segment of a circle, below which the plane of the occiput is quite and falls perpendicularly on the nape with a clear dip of several inches wholly unoccupied by the muscular attachments of the neck.

The hoofs in the living animal are not spread, but rather compressed, with the flat sides of the cleft nearly touching. The sole is flat, rounded, softish, and ascending postallywards the false hoofs which are considerably developed and conical, the fore hoofs larger than the hind: the neck short thick, and sunk between the frontal and dorsal crests the shoulders and trunk very massive and deep, being surmounted by an elevated dorsal ridge conterminous with the ribs: the hind limbs and croup lower and feebler; the barrel tapering ventrally towards the hind legs: limbs low, stout, fine; tail hardly reaching the hocks, slender, cylindeco-tapered, closely haired and ending in a full tuft. The hide is exceedingly thick: the hair close, glossy and of one sort only, though the specimen be a mature male killed in mid winter. On the forehead, on the chin, and thence to the chest (along the abdominal aspect of neck) and on the fronts of the limbs below the central flexures, and there only, is the hair a little elongated and slightly waved or curled; but only slightly and every where else the coat is short, straight and applied. The hairs of the tail tuft also are coarse, a little elongated.

There are 4 teats plainly developed and running in two lines on either

side the scrotum before it begins to depend : a fifth is bastard and irregular. The colour of the animal is black : but the forehead, the whole limbs below the central flexures, the edge of the upper lip and the chin are dirty yellow white : the scrotum, and insides of thighs near it, tan colour : insides of fore legs near body, or sides of chest, also paled and yellow grey : internal nude parts of lip and palate, fleshy white : insides of ears, ruddy fleshy.

BUFFALOE WILD. The head is as long as the Gouri's but not so massive. Its entire facial line is straight : the forehead is much shorter and narrower and convexed across. By reason of the shortness of the frontal bones, the eyes are more raised and much nearer to the horns. In proportion as the frontals are shortened, the nasals (or chaffron) are elongated, giving the head a narrower longer look. The frontals are not raised above the superior edge of the horns, and they pass with a gentle curve to the occiput : Ears larger, narrower and more pointed : muzzle larger and squared between superior edges of the nostrils, which have a longitudinal direction not obliquely across, as in the Gouri. The whole animal is clearly in make longer than the Gouri but not more massive on the whole, more so in the hind quarters, less so in the fore. The back is quite straight without osseous crest or fleshy hump, and the neck and head are in line with it : the tail as short as in the Gouri : skin nearly as thick. The Gouri has more massiveness in the head and shoulders, and its chest is quite as deep or deeper, but the barrel and croup both follow much behind. As the Gouri stands at ease, the crown of his forehead is as high as the crest of his shoulders ; but there is a deep fall between the two, and the back has a long and pretty equable slope from the withers to the croup where there is a sudden droop. The limbs are shorter but as strong though less gross than in Arna, and the hoofs are smaller and less spread : tail similar in both : Ears shorter broader and less drooped in the Gouri Gau. The Arna is longer and higher on the whole ; is equally strong fore and aft ; and the line of the back is quite straight from the head to the tail. Both have the knees and forehead tufted : but the Gouri is uniformly and fully clad in short Bovine soft hair, while the Arna has its head, neck, chest, shoulders and greater part of its body above, scantily dressed in bristly hair, and the rest of the skin, more or less denuded.

June 1.—**FÆTUS IN UTERO OF GOURI GAU.** Snout to rump 16 inches. Height at shoulder 1', at croup 9½. Head (straight) from snout to frontal ridge, 5. Tail 4, is probably not above 3 months old, nude, fleshy

red, with yellow hoops; is a female. 13 Pairs of ribs, 7 true and 6 false per side: dorsal vertebræ 13: Lumbar 6: (Ilium in fœtus joined only to one sacral vertebra) alias, ossa ilii jointed with 1st sacral vertebra only. Hollow of sacrum formed of three. In all 4 sacral: caudal 16: cervical 7: Spinous process of the 7th but moderately raised, process of 1st dorsal twice as long as 2nd and 3rd dorsals, gradually increasing: 4th to 8th nearly equal and longest: 9th-10th about length of 2 3: 11 to 13 gradually falling off; spinous process of lumbar not noticeably larger but broader than those of dorsal. Dorsals: Dorsal vertebræ 13: Spine of dentale vertebræ rather large. The general contour of the head from nose to occiput presents an equable arch in all its length, the frontals having no transverse dip, and but a moderate crest passing backwards with a broad quiet swell: frontals 2, divided longitudinally: 2 parietals occupying the sides of the head, contributing to the full uniform swell of superior surface and indented postally in a triangular shape, which indentation is filled by the antea portion of the occipital, and is still on superior surface of the skull. This triangular occipital bone is bounded below, by the transverse suture, and here the fall towards the postal surface of the cranium *begins*. The second, or true occipital bone, bearing the crest is shaped differently. The others are two for the condyles, and one for the cuneiform process.

This young is a female, and probably therefore as well as on account of its imperfect state, the head shews nothing of the transverse depression or of the huge crest, characterising the frontals of mature male. Kidneys, as in Bos, oblong and multilobular, Intestines 20 feet, of thin uniform diameter. Cæcum $1\frac{1}{2}$ inch long, and 36 inches from end; its diameter and that of gut below it, rather plus that of the small guts. Stomach 8 inches long; length between orifices, 5—from Cardiac to funders, 3; peculiar formation vaguely traceable; great paunch largest; next solvent, rather less.

June 20.—MOTHER OF ABOVE, FROM SAUL FOREST. Snout to rump nine feet. Height before 5 feet. Tail 2 feet one inch. All essential characters and the aspect, of mas, but smaller considerably and dorsal and frontal crests less developed. Colours identical.

Yak, Bisonus Pæphagus, male, mature, July 12.

Nape to root tail (straight),	5	6	0
Height at shoulder,	4	2	0
Ditto at croup,	3	6	0

Depth of chest,.....	2	6	0
Girth behind shoulder,	5	10	0
Foreleg from rest to elbow,	1	10	$\frac{1}{2}$
Hindleg from ditto to true knee,	2	4	$\frac{1}{2}$
Tail only,	1	3	$\frac{1}{2}$
Tail and hair,	2	10	0
Head, from nape to snout (curve),	1	11	0
Ditto from snout to top frontals (straight),	1	8	0
Snout to fore angle of eye,	1	1	0
Thence to nearest base horn,	0	4	$\frac{1}{4}$
Greatest depth of head frontal crest to lower edge of jaw,	0	11	0
Ditto width ditto,.....	0	9	$\frac{1}{2}$
Ear's length,.....	0	5	$\frac{1}{2}$
Ditto maximum width,	0	2	$\frac{2}{3}$
Length of fore hoof (rest),.....	0	4	$\frac{1}{4}$
Greatest breadth of ditto,	0	3	$\frac{2}{4}$
Length of hind ditto,	0	4	0
Greatest breadth of ditto,	0	3	$\frac{1}{2}$

4 teats narrowing wedgewise backwards. Whole of perineum, scrotum, inside thighs and hypogastric region, from anus to prepuce, nude; skin, white. Hair along superior edge of whole of above nudity forming a long fringe with a very definite margin: nudity carried *partially* forward from prepuce to end of sternum with accompanying fringe; and armpits quite bare.

Head largish: facial line straight: muzzle vague and small: nares oblique; eye medial and with brown iris: ears small, oval, horizontal: Dorsal ridge true, elevate, abrupt, confined to withers: limbs very short, sufficiently fine. Barrel deep and compressed. Tail (true) very short, tapered, reaching only to mid buttock. Hoofs and false hoofs much scooped below: the latter, also large. The small guts are 107 feet, mean diameter, $1\frac{1}{2}$ inch: diameter for 19 inches from pylorus, 2 inches: cæcum 2 feet 3 inches, not saccid: max. diam. 4 inches. Ditto at entrance of small gut, 3 ditto at blind end, 2: Large gut 33 feet 4 inches: mean diam. 2 inches; for 18 inches from cæcum, diameter 3 inches, diam. of rectum, 2: spleen 22 inch by 4, of uniform diam.; ends rounded, weight $1\frac{1}{2}$ lb.; kidneys lobulated greatly; $6\frac{1}{2}$ long by $2\frac{3}{4}$ of equable diam: weight of each 10 oz. Liver one great lobe, with 9 small lobuli on lower surface, white without, gamboge when cut into, and full of tubercles: gall-bladder 5 inch. by 4, of uniform width, attached to costal margin of liver which is 7 lb. weight.

Length of 4th stomach 1-10 shape of a bottle with a neck of 4 inches long and $2\frac{1}{4}$ in diameter; above which is an oval dilatation 5 inch in diameter, coarsely rugose internally, and with glandular looking bodies between its inner and outer coats, diameter of pyloric orifice itself, $1\frac{1}{2}$ inch; basal width of 4th stomach, 10 inch: 3d stomach, round, 10 inch of diameter: 2d stomach sporran-shaped or hemispheroidal, 10 inch long by $7\frac{1}{2}$ of diameter: 1st stomach, quite round, 27 inch in diameter. Bladder, as spread, 13 by 7 inch. Depth of sternal cavity, or thorax, 20 inch: from ensiform to spine, width between 11th pair of ribs, $20\frac{1}{2}$. Lungs—right 4 divisions and much the largest, one is the lowest of them—left, 3; lowest largest: another central one from the right, under apex of heart, very small—8 lobes in all. Larynx ringed only in front. Heart 11 inch by $6\frac{1}{2}$ of greatest diameter. Diameter of larynx at branchial division, 3 inches. Thoracic viscera, 14 lbs. Heart with pericardium, 3 lbs. 3 oz.

Another Yak, alive, head large with round forehead and straight facial line; eye full; muzzle moderate; ears small and rounded; body full; limbs low; large, abrupt, sloping ridge occupying the hind $\frac{1}{2}$ of the neck and fore $\frac{1}{2}$ of back, Dewlap none.

Nape to rump,	6	1
Height a fore,	4	3
Ditto a hind,	3	6
Fore leg (from body),	1	5

Tongue white and strongly aculeated, processes corneous, pointed and inclined back in fore part, flattened and level and larger towards root of organ.

In concluding these tedious, but in the present state of science, indispensable details, we may be permitted to enquire whether they suggest or lead to any general principles or facts? Whether, for instance, they justify our separation of the Gouri Gao as a distinct type among the Bovinæ? and whether, as well with reference to the introduction of this new form as to the obvious vagueness characterising the extant definitions of the other forms, these details suggest no feasible improvements upon those definitions?

Both these questions may I think be fairly and usefully answered in the affirmative and I shall terminate this paper with the following improved indications of the principal Genera or groups of the Bovinæ.

Bos. Cranium moderate, proportional or without excess in the cerebral or facial region: frontals shorter than the face, flat and not broader than long. Occipital plane of the skull quadrangular, never arched along the culmenal line; nor indented by the temporal fossæ; smaller much

than the frontal plane and forming an acute angle therewith: Horns attached to the highest line of the forehead, rounded, moderate, curved up or down or forward: 13 pairs of ribs: no true dorsal ridge, but sometimes a fleshy hump: dewlap and muzzle large and square.

Type. *Bos domesticus*.

Bibos. Cranium large, massive, exhibiting preponderance of the frontal and cerebral portions over the facial: frontals as long as the face, concave, broader than long, and surmounted by a large salient crest ascending above the highest bases of the horns. Occipital plane of the skull spheroidal, very large, larger than the frontal plane, deeply indented in its centre by the temporal fossæ and forming an acute angle with the frontal plane. Horns attached below the highest line of the frontals, massive but short, ovoid or subtrigonal, and curving ascendantly: 13 pairs of ribs: a true dorsal ridge coextensive with the ribs and terminating abruptly: Dewlap and muzzle small; period of gestation longer than in *Bos*.

Type, *Bibos Cavifrons*.

N. B. *Gavæus* an aberrant species leading to *Bos*?

Bison. Cranium moderate, depressed, inclining to Bubaline forms in the excess of the facial portion over the frontal, and in the rounding off of the frontals into the occiput: frontals decidedly broader than long, more or less convex, and forming an obtuse angle with the semicircular or trigonal occipital plane, which is strongly ridged by the parietes at its summit, is smaller than the frontal plane, and moderately indented. Horns attached rather in advance of the parietal apex of the Cranium, small, rounded, curving ascendantly, or out of the horizontal: 14 (or 15) pairs of ribs; a true dorsal ridge but confined to the withers and terminating posteally in a gradual slope: Dewlap and muzzle small.

Types, *B. Americ anus*, et *Poephagus*.

Bubalus. Cranium large, elongate compressed or narrow, disproportional exhibiting great excess (a 3d) of the facial over the frontal or cerebral portion: frontals short, narrow, convex, usually forming an obtuse angle with the occipital plane, which is large and circular in proportion to the obtuseness of that angle and to the consequent arcuation of the culmenal line of separation: Parietals merged, not ridged as in the last, nor culmenal. Horns attached to the ends of the highest line of the skull, always exceeding in length that of the Cranium, and usually greatly so depressed, strictly trigonal and neither ascending nor descending but directed horizontally backwards: thirteen pairs of ribs: no true dorsal ridge nor fleshy hump: muzzle large and square: Dewlap medial.

Type *Bubalus Arna. fæm. Arnee*.

Cuvier first divided the Bovinæ into subordinate groups, as usual with him employing only craniological characters. H. Smith has since added to Cuvier's the osteological characters of the *carcase*—the number of ribs and the all important dorsal ridge. I have only more consistently and thoroughly applied these principles at the same time rejecting several palpably false or trivial diagnostics; and having said thus much for my suggested definitions I now leave them to the discretion of the expert. Though I have thought it expedient for the present to consider the *Bos Gavæus* vel *Sylhetanus* (Gayal) as an aberrant species rather than as the type of a new form, I have not failed to remark how singularly, were it regarded in the former light, the entire series might be made to exemplify the quinary and circular system. If we dispose the five supposed types thus. *Bibos*, *Bison*, *Bubalus*, *Bos*, *Gavæus*, we shall find the circularity of the series in many respects very curious and complete. Thus, looking to the crania alone, *Bibos* is connected with *Bison* by broad frontals, salient orbits, and other quasi cervine attributes. *Bison*, with *Bubalus* by the prolongation of the facial part of the skull, and the easy rotund transition from the frontal to the occipital plane. *Bubalus* with *Bos* by comparatively narrow frontals and broad square muzzle. *Bos* with *Gavæus* by flatness of frontals and the acute angle they form with the occipital plane. *Gavæus* with *Bibos* by great width of frontals and increased extent, and peculiar characters of the occipital plane as well as by contraction of the muzzle; the acute angle of the two planes of the skull being still maintained.

If again we pass from a consideration of the crania to that of that osteological carcases, in regard to that most important feature the osseous dorsal ridge, we shall find this ridge at its maximum of development in height and extent in *Bibos*; next diminished in extent in *Bison*, but not in height; lost in *Bubalus*; tending to reappear in *Bos*; and clearly resumed (as is alleged) in *Gavæus*, and in that peculiar shape too which is so highly developed in *Bibos*.

The above indications of circularity in a complete series of five forms are at all events curious and calculated to stimulate further observation. They have therefore been thus mentioned and should future inquiry tend to confirm the conjectured importance of *Gavæus*, it will be but the work of a few minutes to characterise this species as a distinct type.

B. H. HODGSON.

Valley of Nepal, April, 1841.

On the Geology, &c. &c. of Hunumkoondah (H. H. the Nizam's Territory) by DR. WALKER, Madras Army, continued.

The route from Hunumkoondah to Pakhall, lies almost due east. The intervening country is on the whole less hilly than that left behind as far as this place, when a chain of low flattened hills, covered with trees, and shrubs, is observed to extend in a direction from N to S, and is lost in the horizon at both points. The black soil becomes more abundant, no longer occupying mere patches, but forming tracts of considerable extent, and here it may be noted that to an eye at all accustomed to observe this country with reference to its vegetation, an open treeless plain suggests at once the prevalence of the regur soil; for with the exception of the *Butea Frondosa* (Palas), which here, and there appears, there is scarce a tree that affects it, while on the red soils care and industry can alone prevent high jungle from springing up. The granite continues the only surface rock until Sarapore, near which there is an out cropping of sandstone, granite however, re-appears, and may be observed near the road leading from that village to the lake at the crossing of the first stream, but in this neighbourhood it is soon lost in sandstone, which as far as I have remarked forms the masses composing the hills abovementioned. This rock is of various degrees of hardness; it is sometimes of such a dense crystalline structure, as to possess the qualities and appearance of quartz rock; at others the arenaceous form is distinctly visible; the stratification also is of great variety; at certain points the layers are so thick, massive, and irregular, as to resemble unstratified rock; at others the strata are not thicker than a quarter of an inch, and are disposed in parallel layers. This last appearance is particularly well marked at the Chubootra of Shetab Khan, where the rock looks more like a schist than a sandstone. No specimen I have yet met with of the rock effervesces with acids, and the only earthy minerals that it appears to contain are fragments of red jasper, and chalcedony approaching to flint. I have not seen these in situ, but think it probable that they form with the rock a conglomerate. Dr. Voysey speaking of the sandstone rock of the Nizam's territory states 'in no instance have I seen the sandstone stratified,' by which it is clear he could not have been at this place; it is likely that beds of oxydulous iron are to be met with here; I draw this conclusion from the fact of the sandstone being in some cases distinctly encrusted with thin layers of this mineral, and also from the point of junction of two rocks being the locality where metallic minerals are most frequently met with. This

Pakhall tank (for the name of lake, is scarcely in accordance with its artificial embankment) is a fine sheet of water, and takes precedence of all the tanks in Telingana, both as to depth and extent of surface. It is at least thirty miles in circuit when quite full, and besides affording a deep and copious stream for the purposes of irrigation, sends a tributary to the Kistnah, which even at this season of the year merits the name of a small river; it is bounded on three sides by low hills covered with wood, and although the vegetation is now, parched and burnt up, picturesque beauty is by no means wanting to the landscape; immediately after the rains it is quite conceivable that it may vie in scenery with the better known and much lauded Italian Lakes; considering its extent, its value is small, for its whole circumference to some depth is occupied by a dense jungle, and fifteen hundred bigahs under cultivation from its irrigation are but slender tribute to the chief of tanks; the situation is said to be unhealthy, for at least eight months of the year, which may account in part for its thinly peopled neighbourhood.

The draught and carriage bullocks met with appear strong and hardy; they are not equal in symmetry or size to those of Guzerat, or the Ellichpore part of Berar, but very similar to the Malwah animal, to the strength and vigour of which they probably come up; they are usually of a white colour, and are much sought after by the Bunjarries. The method of breeding and rearing these animals would be deemed singularly judicious, did not the necessity of the care, which forces the proprietors into the best mode of management, take from it all merit. The cows from which they are bred are allowed to roam about the jungles in a half wild state, with a few keepers nearly as wild as themselves to tend and occasionally milk them. These possess many of the habits of the wild cattle of South America, and also of the remnants of that aboriginal race still kept in a few British preserves, such as combining for mutual defence, and attacking by the whole herd rushing on in a body; they guide rather than follow their herdsmen, who wisely enough suffer them to choose their pasture ground by that instinct which domestication blunts without annihilating. In a dry year they congregate in great numbers around this tank, from all parts of the country, during the months of April and May, for the pasturage which at that period in the less extensive jungles fails them.

It is evident that no better means could be devised for keeping up a vigorous and serviceable race of bullocks than this treatment of the cows.

In addition to the cultivated plants mentioned in my first letter a small quantity of sugar-cane has been lately added to the list, and with some success; it is unnecessary to say that the expression and boiling of the juice are conducted in the same manner that these operations are performed throughout India from the Himalaya to the Cape Comorin, and that the compound of sugar, molasses, earthy matter and other impurities, called *goor* is the result. A Sugar Mill, wood, carpenter's work and all costs from five to six rupers. The fixed state of the industry of Asiatics cannot find a more fit illustration than in the management of their Sugar Cane. For at least two thousand years, for of that period we have record, that the same rough process has been gone through, the same amount of labour wasted rather than expended, and the step beyond their rude and economical preparation of sugar-candy (in which they have been completely distanced by the Chinese), has never been thought of. A follower of the School of Madame de Stael, who apportioned invention and suggestion to certain parallels of latitude, and improvement, and perfection without discovery to others, would point to the history of the manufacture of this necessary springing up in the South, but perfected by Northern skill as proof of their theory: but another estimate would refer this backwardness to improvement on the part of the Asiatic to that ever enduring insecurity of property which has taken from capital nearly all its power to stimulate or reward industry, from combination all its force, and from skill every disposition to suggest, far less improve.

It would be wandering far from the subject to enquire how this insecurity arose, and how it has been perpetuated, but deficiency of moral, much rather than intellectual energy has been at its root and accompanied its growth.

A very common plant grows on the black soil, chiefly in the jowarrie fields, the *Croton plicatum* mistaken by Burman, for the *Croton tinctorium* of the South of Europe, which plant it greatly resembles in properties and appearance. The *Croton tinctorium*, is cultivated in the South of France for its dye, the litmus or turnsole as it used to be called. Drs. Ainslie and Roxburgh have both suggested the employment of the *Croton plicatum* for this purpose; acting on their opinion, I have extracted, by a simple infusion from the capsules of the plant, a dye having the peculiar properties of litmus, but have failed in purifying it from the extraneous substances contained in the aqueous solution. This is commonly done in Europe by fermentation and by admixture of some alkali, or alkaline earth, by which the blue violet, its peculiar colour, is maintained, but these means will not answer in a tropical country, where the great heat

causes the infusion to pass almost at once to the putrefactive fermentation, whereby the colour is vitiated or altogether discharged, a thing not likely to occur in the more temperate climate of Europe. I see that the same vitiation of colour of the Himalaya Archil, a litmus lichen, is complained of in the transactions of the last meeting of the Agri-Horticultural Society of Bengal, and I would recommend that a sufficient quantity of capsules of this plant (which I can readily supply) be sent to England there to be tested by superior Art, and under the more advantageous circumstance of a cooler temperature. The natives regard the plant as completely useless, and are even ignorant that the juice of the capsules gives a blue stain to cloth; I shall now give some account of the more useful trees and shrubs, all of which are found growing in the neighbouring jungles.

Caryota Urens. This stately palm is indigenous to these jungles, but from all I could hear is not to be met with in great abundance.

The soil would appear to suit it well, as one specimen I saw grew at least to the height of 60 feet. This is the sago palm of the interior as the other species which yield that article are either insular, or coast productions, which would in all probability perish if transplanted from the soil and climate they most affect. To those who have witnessed or even heard of the dreadful and unavoidable calamity of famine to which every well peopled tropical region is subject, any suggestion by which the horrors of that scourge may be averted or even mitigated must prove acceptable; a feasible means of doing this would appear to exist in propagating and carefully preserving these sago trees, and I cannot conceive a fitter purpose for the almost useless waters of this splendid tank, than their contributing to the inestimable end; for a preserve of these palms in its neighbourhood would not only be secured in a never failing supply of water, but the tree jungle with which it is surrounded would afford shade to the young plants, which, from the situation that they are found wild in, would seem requisite. Far be from me the wish to see a race of men palmivorous, for lotophagi and anthropophagi notwithstanding all that the poets have sung of the golden age, may on most occasions be made convertible terms without any violation of the truth, but the very nature of things precludes the supposition of the natives of India ever becoming so, as much as it does our painting ourselves with wood or worshipping the mistletoe. As to the fitness of the food for the support of life during famine, I subjoin the statement of Dr. Roxburgh, who must have been an eye witness of the facts related. 'The pith or farinaceous part of the trunk of old trees, is said to be equal to the

best sago, the natives make it into bread and boil it into thick gruel; these form a great part of the diet of those people, and during the late famines they suffered little, while those trees lasted. I have reason to believe this substance to be highly nutritious. I have eaten the gruel, and think it fully as palatable as that made from the sago we get from the Malay countries.'

The fronds make a better cordage than those of the *Elate sylvestris* commonly used by the Coonbies.

The worst property of this palm is the only one with which the natives are familiar, the inexhaustible supply of Toddy which it yields.

Butea Frondosa (Palas) *Butea Superba*.

Both these, and especially the last, which is a magnificent climber with a trunk of the thickness of a man's body, yield the palas gum or East India kino as it has been called; of this a specimen is sent. Dr. Royle has lately estimated the quantity of tannin, which this gum yields at no less than 50 per cent, two per cent more than that yielded by the Catechu of Bengal.

Tannin is the substance which, by combining with the gelatine of hides forms leather, and is that which gives to oak bark, Aleppo galls, *Valonia*, &c. their high commercial value. Although every second tree in this part of Telingana is the Palas, there is not one ounce of gum collected, being reckoned wholly useless and unprofitable by the natives.

I cannot help thinking that this production will soon be looked on as very valuable in the arts, should this happen, they will not be wanting a supply from Telingana, where both *Buteas* are so common.

Rohuna tree—*Swietenia Febrifuga*.

The bark of this tree is the well known febrifuge—On the authority of Dr. Ainslie, certainly very respectable—Dr. Lindley, in his valuable works has stated that given in large doses it is apt to produce nervous symptoms and hence objects to its use—does not the very same objection apply to *Cinchona*?

Besides the evidence of any one physician on the febrifuge properties of a medicine is wholly insufficient, for what is so common as head affections in tropical fevers. With the permission of the resident, I shall send a parcel of the bark to the medical store-keeper of H. H. the Nizam's Army, that it may be sent to Britain for trial in the less bulky form of an extract.

Wrightea Antidysenterica.

The bark of this small tree is the once celebrated Conessi bark, it is said to have got into disuse from other inert barks being substituted for

it. I shall send also a parcel of this bark to the medical store-keeper. *Sterculia Urens*. It is said this tree yields a gum similar to the gum *Tragacanth* of commerce (Royle).

Buchanania Latifolia Chironge tree. The nut is used for all the purposes of the Almond by the natives, it would in all probability produce as good an oil as the almond.

Chloroxylon Swietenia, juice said to give a yellow dye. Of other useful trees here are *Nauclea Cordifolia*, *Mimosa Xylocarpa*, *Mimosa Serissa*, *Allangium Hexapetalum*, *Pentapteracoriacea*, *Dalbergia*, *Latifolia*; *Hibiscus populneus* *Terminalia Bellerica*, *Strychnos Nux Vomica*, and a species of *Gmelinu Ulmus integrifolia*, well adapted for furniture building, &c. all are in great abundance. The Teek *Tectona grandis* is stunted and worthless in these jungles, and the *Diospyrns Melanoxylon*—Black ebony, grows to no great size. Of the less useful trees are *Careya Arborea*, *Barringtonia acutangula* *Ixora parviflora*, *Ficus Comosa*, *Erythrina Suberosa*, &c. The principal shrubs consisted of the *Ochna squarrosa*, *Grewia orientalis*, *Symphorema involucrata*, *Gardenia Latifolia*, with fragrant beautiful flowers, *Trophis Aspera* and *Premna Tomentosa*. The climbing plants are chiefly the *Sifonia Nutans*, *Combretum Ovalifolium*, the *Ventilago Madraspatana* and the *Otax*.

The *Cissus Cornosa* and *Dalbergia Scandens* were also seen. The most common parasite was the *Loranthus scurrula* the *Bassia Latifolia*, Mowah tree was comparatively rare. Some trees were so utterly without leaf, or flower, that their names or value could not be conjectured but these were in no great number. The Herbaceous vegetation was completely burnt up.

Note and Tabular Statement N. W. Frontier.

The annexed statement (No. I.) will shew the enormous increase which has taken place in the Export trade to Cabool during the past year, aggregating on the three descriptions of produce no less than 38,08,873 rupees as compared with the preceding year.

Of the three denominations of exports, one only, being Country produce is prepared from Official records (chokie registers). No Account being taken at the customs chokies of free goods, I have been obliged to refer to the Merchants themselves for information as regards them, and they have obligingly allowed me access to their ledgers, from whence the amount of exports under the heads of 'British Manufactures and Productions,' and Sea Importations, has been ascertained, not in exact details, but sufficiently accurate to meet the object in view.

I may as well mention, that previous to the occupation of Afghanistan by our Troops in 1838-39, the Exports from these Provinces were trifling to a degree, the returns for the Imports being for the most part sent back in specie. Within the last year or two, however, the demand for our Exports has so greatly increased, that instead of taking back specie, Hoondies to a very large amount are sent to Delhi from Cabool, to meet the deficit caused by the excess of Exports from these Provinces, over the Imports from Afghanistan. Some time last year one merchant sent us a single remittance, Hoondies on Delhi from Cabool for no less a sum than forty thousand rupees, to be invested in the purchase of British goods.

Formerly the whole of the Export trade with Cabool, was carried on by the fruit merchants, who merely took back a small portion of their returns in British manufactures. There are now, several highly respectable merchants wholly unconnected with these traders, who confine their operations to exporting, from our Provinces goods for which, at present, they are unable to find a return in kind.

As it shews how anxious they are to establish a return trade, I will mention, that more than one instance has been reported to me of Russian goods (principally hardware and spurious gold tissue) having been, brought across my frontier line, the packages having Moscow marked on them, these goods were however of so inferior a description as to be rejected by the natives whenever offered for sale. Indeed the cutlery was inferior to that made at Monghyr and in the Delhi Bazar.

In reply to your second question, as to whether I can do nothing to help the Cabool Merchants, I can only state, that I have done and am doing all in my power to encourage this enterprising and deserving class of men, in every way possible.

In the mean time, I would suggest that the first object of Government should be to open the route for trade, through the Khyber Pass, by obtaining from the intermediate states, some modification of their present system of duties, which press so hard on the merchant, as to drive him round by the circuitous route now taken, where they are subjected to exactions it is true, though less oppressive and vexatious in their nature than those in force in the Seik states.

P. S.—To shew the enterprising disposition of the Cabool Merchants, I will mention that a short time ago I gave one of them a note to Mr. Clarke, to aid him in his endeavour to take an investment of Indigo, Jewellery, Gold Lace, &c. to Yarkund.

On the 'Electro-type.'—BY CHARLES HUFFNAGLE, Esq.

REFERENCES TO THE PLATE.

- | | |
|------------------------------------|--------------------------------------------------------------------|
| 1. Wooden cell. | 5. Copper plate, on which coin is placed. |
| 2. Glass cylinder. | 6. Zinc plate on acid liquid. |
| 3. Brass binding-screw. | 7. Crystals of sulphate of copper to keep up a saturated solution. |
| 4. Shelf perforated in the centre. | |

MY DEAR TORRENS,—I felt gratified, at our last meeting, to find you were also much pleased with the fac-simile of my coin of 'Alexander' by the Voltatype, and I cheerfully promised at your desire an account of the process, for which, and also for the successful result of the experiment, I am indebted to my talented friend Professor O'Shaughnessy. I believe detailed accounts have already appeared in print, but this mode of copying coins and medals is so exceedingly *simple*—the result so surprising and satisfactory, and it is so fully in the power of every body disposed to devote the slightest attention to it—that we cannot make it too widely known.

1st. You must provide yourself with a wooden cell 8 or 10 inches square—with an inside coating of sealing wax—or other cement to render it water tight. This box should be 3 inches deep, with a ledge 1 inch from the top to support a wooden shelf.

Affix to the edge of the box a brass binding-piece, formed of square brass, perforated with two holes and furnished with binding-screws.

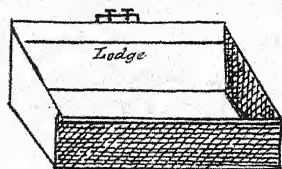
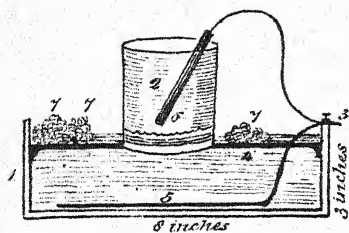
2d. A glass cylinder open at both ends, to the lower end of which a piece of *moist bladder* must be secured with a *waxed cord*, and the diameter of this cylinder must correspond with the perforation in the shelf fitted to the square box.

3rd. Plates of *sheet zinc* amalgamated by mercury; i. e., by rubbing a few globules of mercury over the zinc, after dipping it into a mixture of one part of sulphuric acid and one of water, must also be provided; and these plates corresponding in length and breadth to the size of the cylinder, must be attached to a *copper wire* 6 or 8 inches long.

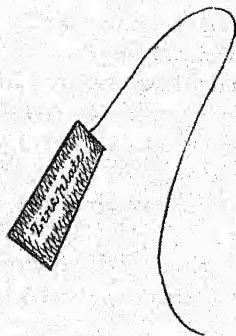
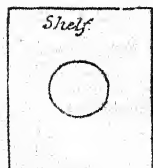
4th. A *plate of copper* 3 or 4 inches square with a *copper wire* 6 inches long.

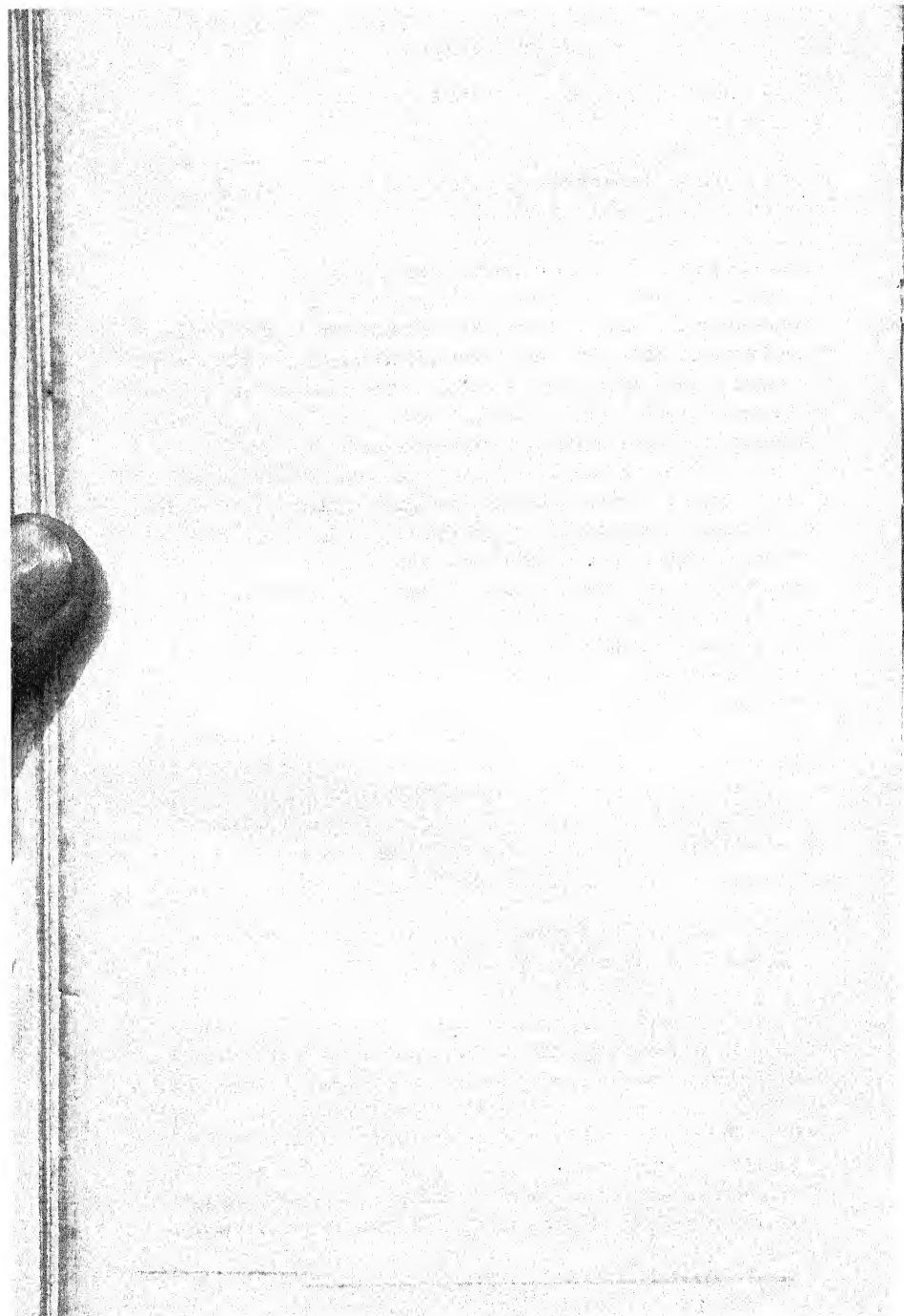
5th. Supplies of sulphate of copper in crystals, and concentrated sulphuric acid.

When you proceed to use the apparatus, prepare a saturated solution of the blue salt, in soft hot water, strain it off turbid and allow it to cool—



Cylinder





prepare a dilute acid with one part of concentrated sulphuric acid and a pint of water.

Brighten the *copper plate* and place the coin to be copied thereon, then apply a coating of bees-wax over all parts of this plate and wire, allowing the surface of the medal you wish to copy, to be the only surface exposed.

Place the plate so that it shall rest flat upon the bottom of the cell—fill this with the solution of sulphate of copper to within half an inch of the top—fix in the shelf, and over the perforation place the cylinder, charged with the dilute acid. Into the acid introduce the zinc plate, and now let the wire of this as well as that of the plate of copper be inserted into the brass '*binding-piece*.'

[The coin should be previously warmed—wax rubbed over the side we wish to copy and then the wax while warm rubbed off carefully with a soft rag. Lumps of sulphate of copper must also be placed upon the shelf in order to keep the solution in a saturated state.]

In twenty-four hours a reverse impression of your coin will be deposited, to remove which, take the coin from the copper plate, and warm it over a spirit lamp for a few seconds, then introduce the edge of an ivory knife, and you will be able to detach the copper deposit with ease. You have now only to substitute *this mould* as in the first step for the coin, and you will have your '*fac-simile*.'

Here then you have the account you wished for, in which, recollect, I don't claim the least *originality*.

Yours very truly,

CHARLES HUFFNAGLE.

9th June, 1841.

Roree in Khypoor; its Population and Manufactures.—By CAPT. G. E. WESTMACOTT, 37th Regiment Bengal N. I.

(Continued from page 415.)

There were four paper factories in the town of Roree in 1839, worked alternately by men who had learnt the craft from their master Jhoora, the principal manufacturer, who receives two anas a day from each apprentice. The finest paper he produces is inferior in quality to that of Delhi and Agra; it is made entirely of old hempen rope and string, brought from Hyderabad in lower Sind, and sells in Roree at 6½ rupees a *mun*; the consumption is very limited and it forms no part of the regu-

lar imports of Roree. The manufacturer draws his supplies from time to time from Motoo, a *suhokar* of Noushuhra, who also supplies the factories of Khympoor and Shikarpoor. The *suhokar* is exempted by government from taxation, in consequence of services rendered by his ancestor to the Talpoor family of Khympoor, who resided, I believe, at the town of Noushuhra belonging to Meer Roostum, before they acquired sovereign power; this of course enables the *suhokar* to sell hemp at a cheap rate and gives him almost a monopoly of the trade.

The hemp is chopped on a plank, with a knife, into small pieces, and thrown into a washing vat one yard square, and half the depth, coated with mortar. It holds three seers of lime and two of *khar* (impure alkali), with water contained in five or six earthen pots; the manufacturer does not measure the water and is ignorant of the quantity required, but a pot contains usually ten seers, and when very foul and sandy it is purified with alum.

The hemp is washed, bleached, and macerated in the vat, and after being shaped into cakes and masses of all sizes, is put in the sun to dry; it is thrown afterwards into a pit to reduce it to pulp. The pit is five feet long, four feet broad, and three feet deep, paved with large stones and half of it nearest the bottom lined with stone. The tow is pounded half as long again in winter as it is in summer; in the latter season the shreds are more easily divided and macerated. Two or three men work the machine by placing one foot on a lever (F.) nine feet long, connected with a hammer (E) (see plate Fig. 4, No. 113) half the length, and the other foot on a bank of earth (B.) along side it, four feet long and eight inches high. They support themselves on a transverse rest six feet long (A.), or by grasping loops of ropes suspended from the timbers of the shop roof. The lever is kept in its place by stakes and a groove, and a transverse beam seven feet long (C.) prevents it rising above a certain level. The labour of working the pedal is extremely fatiguing in the hot months; a man sits in the pit (D.) during the operation of pounding the tow, to separate and moisten it occasionally with water, and pushes it under the hammer; this is usually done by the master; twelve hours labour are required to reduce to pulp a seer of tow, but a larger quantity is generally prepared at one time. The tow is taken from the pit in flat cakes and masses of the pulp weighing fifteen or sixteen pounds, and piled on stones in the sun to dry; afterwards it is thrown into another vat four feet square and two feet deep, lined throughout with mortar, and, after being diluted to a proper consistency with water, is separated with the hand and stirred two hours, and left about nine hours in the

vat. It is then dipped up by the workman on a light wooden frame or mould of seven bars, on which a mat (*boora*) is laid of the size of the intended sheets, made of *sur* (the stem of *moonj* grass) split into extremely fine pieces and united with horse hair.

The man sits on the edge of the vat, and is often provided with a pipe with a long tube, to which he applies his mouth from time to time without staying his work. He regulates the number of dips of the mould accordingly as he wishes to give consistency to the paper, always taking care to stir the liquor well before he raises it. He transfers the sheet, as soon as formed, to another frame of fine reed, which is placed upon one of *sirkee* (the upper stem of *moonj* grass,) carefully laying sheet upon sheet as he takes them from the vat, without the interposition of cloth of any kind, and leaves them about nine hours to drain; the sheets are then pressed under a plank, upon which two men stand for an hour. Those made during the day are pasted at night against a mud wall made smooth with clay and cow dung, and the men use for the purpose soft brushes of *moonj* grass ten inches long, which they prepare themselves. The paper is removed in the morning to a plank or board, where it is rubbed with a cotton cloth dipped in wheat flour, and suspended on hempen strings raised on sticks in a yard for twelve hours until perfectly dry; it is then carried back to the board and put into the hands of the polisher, who does not belong to the factory: he rubs it with a large smooth stone to give it a glaze or polish. Some of the stones are black basalt from Khorasan, and appear to have been rounded by the torrents; and smooth pieces of limestone and white marble are also used. On the completion of this process, the rough edges of the paper are cut with large scissors, like those used by tailors, and it is now ready for sale in the bazar.

On my second visit to this factory I found the work stopped in consequence of the men having gone to the British camp at Sukur, where they were employed in other labour at eight pys (four pence) a day. Until the establishment of our camp, there was a small consumption of paper, and it is by no means a profitable occupation; Jhoora could not afford to employ men above half a day at a time, and their labour in the factory was more severe than that exacted from them in the cantonment. The manufacturer (Jhoora) employs four men (Moosulmans), at ten pys ($4\frac{1}{2}$) each per diem, to sweep the building, chop hemp, bring water from the Indus, and conduct the whole process of manufacture. He estimated the cost of his shop and machinery at 100 rupees, and the pit in which the tow is beaten at half the sum, but was not positive as his father built it. It is a large sum, but I do not question his veracity, as he did not over-

value other parts of the machinery; the large stone at the bottom of the pit took twenty men to lift it, and this, and other large stones at the bottom and sides of the pit, were brought from a long distance.

	Rs.	A.	P.
Pit,	50	0	0
Two vats lined and terraced at the edges with two <i>mun</i> s of mortar,	10	0	0
Wooden lever (<i>Talee F.</i>) and hammer, E.	10	0	0
This is exclusive of seven seers of iron fastened to the bottom of the hammer which cost,			
Transverse beam (C.) and supports,	7	0	0
The beam (A.) and its two supports,	2	0	0
The shop which holds the three vats and machinery,	1	0	0
The shop which holds the three vats and machinery,	5	0	0
The shop was a kind of shed, open at the sides and measured twenty-four feet in length and eleven in width. Two sides were walled in with boughs of the date tree, and the roof was mat and reeds upheld by wooden posts. Neither mud nor bricks were used in the construction.			
Six frames or moulds of fir wood measuring 23 inches in length and 20 in width, for raising the stuff from the cistern, at 6 <i>anas</i> each,			
Three fine mats of split reed 23 inches long bound together by horse hair to place on the frames, at 6 <i>anas</i> each,	2	4	0
Sirkee mat to receive the sheets,	1	2	0
Board on which the paper is polished,	0	0	2
Polishing stone,	0	4	0
* Earth pot (<i>muttee</i>) to contain a <i>mun</i> of water,	0	2	0
* Earth pot (<i>muttee</i>) to contain a <i>mun</i> of water,	0	3	0
Two earth pots (<i>dillee</i>) containing each ten seers,	0	0	4
Thirty strings to hang paper on,	0	0	4
Pair of scissors for cutting paper,	0	4	0
Chopper (<i>koolharee</i>) to chop hemp, containing half a seer of iron,	1	0	0

Rs. 91 5 0

I need hardly observe the fine texture of paper depends on the hemp being well beaten, and the number of dippings required to form a sheet depends a good deal on the vatman's dexterity in raising the stuff; sometimes five and six dippings are necessary. Hemp is pounded four days

* Earth pots are dear at Roree, and there are only two potters in the town.

to form fine paper, and three days to form a coarse kind, 18 or 20 days are required to convert a *mun* of hemp rope into paper, which gives sixty large quires of twenty four sheets to a quire, each measuring 22 inches by 18; or one hundred small quires measuring 20 inches by 12; supposing the assertion of the manufacturer to be true, that to convert a *mun* of rope into paper costs him twenty rupees, he derives a profit of 25 rupees.

	Rs.	A.	P.
One <i>mun</i> of hempen rope to make paper of the best quality,...	6	8	0
Wages of Workmen,...	9	8	0
Lime at 50 seers per rupee,.....	0	1	0
Two seers of khar (alkali) at 1 pys per seer, ..	0	0	2
Polishing 60 quires at 1 ana per quire, ..	3	12	0
Alum,	0	1	0

Rs. 19 14 2

The manufacturer sells a quire of large paper of the best quality when polished at 12 anas, and unpolished at 10 anas; sixty quires at 12 anas per quire give Rs. 45.

Five quires of paper made in another factory, sold for a rupee, and were the produce of three and four layers of stuff; the machinery and apparatus were similar to those I have described, but not so expensive, and the manufacturer had less capital than his neighbour. The pounding pit had a single stone at the bottom over the spot where the hammer descended, the rest of it was covered with planks to prevent the stuff mixing with earth, and the sides faced with brick; the pounding pit, hammer, and shed, cost together 80 rupees.

There was only one reservoir lined with mortar measuring nearly two feet square and 2½ feet deep, into which the stuff was thrown after it was removed from the beating pit;

	Rs.	A.	P.
It cost,.....	5	0	0
The branch frame for taking up the stuff,.....	0	8	0
Fine mat to place upon the frame,	0	4	0
Board on which the paper is polished,	0	6	0
The shop which held the vat,	32	0	0
Lever, Hammer, and supports,	21	0	0
Pit,	18	0	0
Polishing stone, earth pots, and strings,.....	0	8	0
Scissors and chopper,	2	0	0

Rs. 79 10 0

The shop measured eleven feet in length and seven in width. The walls were sun baked brick, and timber interlaced with tamarisk boughs, the interstices filled with mud, and the roof of timber covered with reeds and clay.

The factor paid four workmen from six to ten pys a day (three pence or five pence), but did not employ them regularly; the vat man who raised the pulp worked only half the day, as his labour is very constant and tiresome, and received two anas (three pence.) The factor does not weigh the tow as he considers it would bring ill-success on his work, and throws into the pit any quantity that is cut.

Roree receives silk from Persia, and from Bokhara and other parts of Toorkistan. During the war between Shah Shoojah and Dost Mahomed Khan in 1833, the supply was stopped six or eight months and the weavers out of employ. The invasion of Affghanistan by the British eight years afterwards, interrupted commerce by the route of Kandahar and the Bolan Pass, but did not interfere with the supply of silk from Cabool which was, on the contrary, in excess of the quantity imported the preceding years, and came as usual, on camels *viâ* Peshawur, Dera Ismail, Mooltan, and Bahawalpoor.

A single hand silk loom can be established in Roree for 4 rupees, or about 8 shillings English. I annex a list of tools and their cost :

	<i>Rs. A. P.</i>
A Spinning Wheel,	1 4 0
Rods of Surkunda reed passed through the warp to preserve the shape or lease, cut in the wilds.	
The pit or workshop, three feet long, two feet wide, and two feet deep, dug by the weavers.	
The cloth-beam or breast roll, a square beam of <i>talee</i> wood three feet long, placed over the pit and to which the ends of the warp are fastened,	0 8 0
<i>Kite.</i> Two upright posts six inches high which support the breast roll and in which it revolves,	0 0 4
Handle (<i>phirnee</i>) to turn the breast roll,	0 0 1
<i>Sundulee.</i> Two sticks attached to the breast-roll to which the warps are fixed,	0 0 2
<i>Hutha.</i> The lay cap $2\frac{1}{4}$ feet long,	0 8 0
<i>Phunee.</i> 'The reed' a sort of comb of split Surkunda reed between which the warp passes,	0 1 0
<i>Dootna.</i> Two painted and varnished rollers forming part of the heddles to which the loom is fixed and suspended from the shop roof,	0 0 2

<i>Ruchee</i> . Four thin sticks set upright and connected by cotton threads and forming part of the heddles,	0 4 0
Cotton threads to form the heddles for suspending the <i>ruchee</i> , and lay cap to the shop roof,	0 2 0
<i>Ponsur</i> . Two round sticks attached to the <i>ruchee</i> and suspended in the pit,	0 0 2
Two wooden treadles,	0 0 2
<i>Duna</i> . Horizontal beam or yard roll on which the ends of the warp are wound,	0 0 1
Post to which the yard roll is fastened by a rope,	0 0 4
Rope of date leaves,	0 0 6
<i>Nar</i> or shuttle of <i>taree</i> wood, the only part of the machine that is formed neatly,	0 8 0
Iron reel or needle,	0 0 $\frac{1}{2}$
<i>Sipee</i> . A thin plate of blunt iron $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches wide for scraping the woof,	0 2 0
<i>Buhla</i> . A piece of leather paid with the hand under the woof when it is scraped,	0 0 4
Iron pincer to pick off rough threads from the surface of the silk,	0 0 2

 Rs. 3 14 0

A weaver earns four anas (six pence) a day, and will finish a piece of silk 24 yards long and 11 inches wide in a month. The manufacturer's profit is from 3 to 5 rupees.

A piece of *Duryaee* 24 yards long and 11 inches wide manufactured of *Shalbafee* or *Nuwabee* silk from Toorkistan, costs :—

Orange colour 12 rupees or 8 annas a yard.

Blue 11 do. or 7 do. do.

Yellow and green 10 do. or 6 do. do.

Raw undyed silk thread imported from Persia and Toorkistau sells in the bazar at 16 or 17 rupees the seer, and $\frac{1}{3}$ or $\frac{2}{3}$ of a seer are required to weave a piece 96 yards long and 11 inches wide. The import duty on undyed silk thread is 1 rupee per seer and $1\frac{1}{2}$ ana extra on thread dyed at Shikarpoor or elsewhere in Sind.

The dyer's charges are :—

For reddish-brown or orange colour, formed by safflower (the dried flowers of the *Carthamus Tinctorius*), $2\frac{1}{2}$ seers per rupee.

For blue, formed by Indigo, 1 seer per $2\frac{1}{2}$ rupees.

For green, formed by Indigo with gooljuleel (mettilet,) 3 seers per rupee

For yellow, formed by gooljuleel, 3 seers per rupee.

They are the only colours used in Roree by silk-dyers, and the weavers are ignorant how to produce any pattern or design.

When the weaver receives thread from the dyer he smears ghee over it to give it strength and flexibility, and applies wheat starch occasionally to the woof with the point of a stick enveloped in cotton rag.

As far as I could ascertain there are 160 silk looms in Roree which pay a yearly tax of 900 rupees, which is 200 rupees less than the sum realized in the time of the late Meer Sohrab. I visited several loom-shops and found them all in a state of wretchedness and discomfort. The shop from which the description is taken, measured eight feet in length and twelve feet in width, and cost ten Shorabee rupees; it had a pent roof of reeds, mats, and date leaves in bad repair; the ends rested on square pillars of sun baked bricks and the middle on posts, and a low door was built in a wall of tamarisk boughs kept together with posts set on end and sticks tied across them. It was no protection from thieves. Work-shops are not, however, built with a view to secure property, and tradesmen and mechanics rarely sleep in them; they return home at night and carry with them any articles and machinery likely to tempt the cupidity of a thief.

Cotton weavers have a loom of the same description as silk weavers, and worth 3 rupees:

	Rs.	A.	P.
The spinning wheel,	1	0	0
The hand wheel,	0	0	3
(This is worked by a female whose hire is included in her husband's wages of two anas (3d. a day),			
30 lease rods of Surkunda reed cut in the wilds.	1	0	3
The pit in which the weaver sits dug by the weavers.			
The cloth-beam or breast-roll $4\frac{1}{4}$ feet in length,	0	8	$\frac{1}{2}$
Two posts in which the cloth beam revolves,	0	0	2
The lay cap 3 feet long,	0	8	0
<i>Dootna</i> and <i>Sundulee</i> , part of the heddles,	0	0	4
Two <i>Ruchee</i> part of the heddles,	0	6	0
The 'Reed,' of split Surkunda reeds,	0	0	3
Two <i>Ponsur</i> ,	0	0	2
Two treadles,	0	0	2
<i>Duna</i> , or horizontal beam,	0	0	1
Goats' hair rope to which the end of the warp is fastened, ..	0	0	5
Shuttle of <i>kundee</i> wood, and iron reel or needle,	0	4	$\frac{1}{2}$
Cotton threads and horizontal sticks firming the heddle or harness for suspending the loom to the shop-roof, made in the shop.			

In 1839, coarse cotton thread fetched in the Roree market from four to sixteen anas a seer, and fine thread four rupees a seer. A weaver works a piece of cloth 12 yards long and $\frac{1}{2}$ a yard wide in a day, $\frac{1}{4}$ seer of thread is sufficient for a piece this size which sells for $1\frac{1}{4}$ rupee. A piece of coarser texture which consumes a seer of thread sells at $\frac{3}{4}$ rupee. A weaver in Roree earns 2 anas (3 pence) a day, which is a half-penny more than is paid in the best cotton factories at Boulac (Cairo). The master's labour is calculated to be worth double, and he prepares the most difficult part of the work.

The shop I visited held two looms and a female spinner. It measured 15 feet long and 9 feet wide and cost 5 rupees, three of which went for labour; two sides of it were fenced with tamarisk twigs unplastered and kept together with sticks laid across them; the third side was open, and the fourth joined a mud wall of another house: the shop had a low wooden door and a broken roof of mats and reeds propped on posts, and this is a fair description of by far the greatest number of shops belonging to mechanics and artisans in Roree.

Cotton cloths were among the few articles which became cheaper at Roree after the arrival of the British. This was owing to the large quantity imported by merchants from the Punjab and Bhawalpoor: they took advantage of the diminution of duties and increased facilities of navigating the Indus.

The process of printing and dyeing calico is usually conducted by one person, and the proprietor of the shop I am to describe, had no assistants, and performed the whole work himself. Working dyers receive 2 anas a day, and food morning and evening, consisting each time of half a seer of wheat flour. The dyer had a walled court ten yards long and six yards wide which enclosed two sheds. The one he occupied himself measured twelve feet in length and ten in width, and he let the other to a cotton spinner.

To prepare cloth for the print and dye, it is immersed four hours in an earthen pan of alum and water mixed in the proportion of 1 to 16, and care must be taken if it be intended to give the piece a uniform tinge from the dye, that this substance, technically called mordant, is universally applied over the whole—otherwise it is applied only in parts; it is then withdrawn from the alum mordant, drained, and washed. A piece of cloth, 24 cubits long and 1 cubit wide, requires an *ana's** weight of alum and five seers water. The dyer afterwards grinds some tamarisk flowers (*sak oor*)

* An *ana* is a Sind weight equal to 6 Shorabee rupees.

in a common stone hand mill and mixes one part flour with sixteen of water. Cloth impregnated with this fluid acquires a yellowish hue, and the immersion is repeated before it is consigned to the colouring vat.

Black spots are left on a white ground of cloth by applying to these points a paste, composed of acetate of iron, gum (*cheer*), and fuller's earth. The dyer forms the acetate from old nails or any rusty iron which he throws into an earthen pot with wheat starch and water, in the proportion of one of iron, two of water, and one fifth wheat starch, and exposes it in the sun four days in summer, and eight in winter as the iron is then longer dissolving. The stuff is transferred to another vessel and fullers' earth melted with it in no fixed proportion until it becomes a thick paste, and to every five seers he adds an *ana's** weight of gum.

The dyer pours the stuff into a shallow box of baked clay, glazed inside and out, and measuring eight inches square and three inches deep. A frame five inches square formed of twelve small bars of *sirkee* reed, bound together at the ends by transverse wooden bars and twine, is set on the paste, and over it a piece of coarse wool on which the dyer presses the block to avoid taking a superabundance of the stuff which would happen if he plunged the block directly into it. The dyer had twenty blocks or engravings in relief, of different designs, made at Shikarpore of tamarisk and tamarind wood, and measuring four and five inches each way. The stuff which accumulates from time to time in the engravings, is removed at intervals by small brushes made of boar's bristles.

Madder (*munjeeth*) is the dye stuff used for producing red colour, and the best kind sells at $2\frac{1}{4}$ seers per rupee; it is not a product of Khypoor and imported from Khorasan and India, and through the sea port of Korachee. The stuff is obtained by boiling one part madder in thirty parts water in a copper vessel, till the colour is thoroughly extracted from the root, which takes about four hours. The root is then withdrawn from the pot and thrown away. Eight pieces of cloth each 24 cubits long and 1 cubit wide, are sometimes dyed at once, and boiled two hours in four seers of madder. The cloth is taken from the colouring bath to a river, and beaten on a plank cut in furrows, like the one used by washermen, to deprive it of superficial colouring maker. It is rubbed an hour with cowdung and left all night to dry, and in the morning washed again in the river in the manner noticed, and spread in the sun to dry. The dyer renders the colouring matter a more decided red by mixing *khar* (alkali, with water,) and sprinkles it upon the

* An *ana* is a Sind weight equal to 6 Shorabee rupees.

cloth. Two ana's weight of alkali are sufficient to moisten a piece of cloth 24 cubits long. He washes the cloth a third time in the river, carries it home, and, after folding it, beats it into a smooth even surface with a wooden roller which terminates the process. Four days are required to print and dye a piece of cloth 24 cubits long and 1 cubit wide of any pattern. Fine calico absorbs a larger quantity of fluid than a coarse kind. The man charges one rupee for printing and dyeing a piece this size of the best pattern, and half the money for an inferior pattern. In both instances the charge for printing amounts to one fourth of the whole sum. The man does not use any other colour than madder, and he was the only dyer in Roree in 1839. The dyers of green and yellow cloths had fled to Khyrpoor to escape the exactions of the Governor, and the dyer of blue cloths had removed his shop for the same reason to the British camp.

The Roree cotton printer had :—

	Rs.	As.
Ten wooden blocks (<i>chemba</i>) 4 inches long and $2\frac{1}{2}$ inches which cost 5 anas each,	2	2
Ten wooden blocks 4 inches square at 4 anas each,	8	3
Two small brushes of hog's bristles for cleaning the blocks,	0	5
Two boxes (<i>dubkee</i>) of baked clay, 2 anas each,	0	4
Bench $4\frac{1}{2}$ feet long and 2 feet wide raised on legs to hold the cloth for printing,	1	0
Mat of date leaves,	0	1
Large earthen pan,	0	8
Three earthen pots,	0	3
	<hr/>	
	Rs.	7 15

The price of ingredients he requires to carry on his business is stated below :—

	Rs.	As.	Ps.
Madder root $2\frac{1}{2}$ seers,	1	0	0
Tamarisk flowers (<i>sakoor</i>) brought from the wilds per seer,	0	0	8
Gum (<i>cheer</i>) per seer,	0	8	0
Alkali (<i>khar</i>) per seer,	0	0	1
Alum per seer,	0	6	0

The road duties, and *octroi* or barrier duties, levied on four-footed animals is ruinously high, and of course affects their hire. For instance between Roree and Kyrpoor, a horseman pays :—

	<i>Pys.</i>
At the gate of Roree,.....	2
Half way,	$\frac{1}{2}$
At the gate of Kyrpooor,.....	2
	<hr/>
	4 $\frac{1}{2}$

The distance between these places is only 8 kos.

Between Roree and Shikarpore, 16 kos, he pays:—

	<i>Pys.</i>
At Roree,	2
Indus ferry, .. .	3
At Sukhur, .. .	9
Village of Driha 4 kos from Sukhur,.....	4
Barrier of Shikarpore,	5
	<hr/>
	23

or nearly one shilling English. These heavy charges are the consequence of Roree, Sukhur, and Shikarpore being under separate Governors.

Hire of cattle from Roree to Shikarpore, and Khyrpoor.

	<i>Rs. Is.</i>	<i>Rs. As.</i>
Of a Camel,.....	1 4	1 0
Of a Horse or Pony,	0 12 or 16	0 8 or 9
Of a Mule,.....	0 10	0 8
Of an Ass,.....	0 7	0 5

Hindoo merchants and Bankers exact 24, and sometimes 36 per cent. for money borrowed by zumeendars and persons in needy circumstances, and collect it monthly. But in money transactions with each other they only take 6 per cent. No moosulman practices usury.

Ferries are little frequented except on the line of commercial intercourse, and the roads leading directly to large towns: in other situations they do not give regular employ to the boatmen. Flying bridges of a single rope fixed to stakes on the banks, are thrown across canals and streams cut from the Indus, and a man pulls the passenger across in a boat. The charge for crossing the Indus is, one pys a head for foot passengers double for an ass, and quadruple for a cow or buffaloe, and on small rivers like the Anul and Nuhra, half these respective amounts.

Boats proceeding up and down the Indus before the treaty of 1839, which established the free navigation of the river, paid a toll of one rupee

at Bukur without reference to their tonnage, and tolls at Kurdehee and Thatta. They were searched at Hydurabad, Sehwan, Chilka on the Arrut, Khyrpoor on the Nuhra, and at Roree. An attempt to conceal goods not entered in the bill of lading, condemned the cargo to confiscation and the owner to fine and imprisonment. He must exhibit the merchant's accounts of whom he purchased the goods and a certificate of the custom house officer of the place where they were embarked, without which they are stopped. Grain landed at Roree is charged about $4\frac{1}{2}$ per cent. duty regulated by the price current of the town.

The natives of Sind, with the exception of a few high caste Hindoos who abstain from fish, subsist on fish, milk, and wheat or *joowara*, or rice where it is cultivated, and a variety of vegetables which grow in plenty. From motives of economy they eat wheat during the *rubbee* or spring harvest and *Joowara* or maize in the *Khureef* or autumnal harvest. The price of rice has risen considerably since 1838, and is now beyond the means of the lower orders except in districts where it is the staple. Rice is the red kind and people clean it by pounding it in large wooden mortars with salt in the proportion of one part salt to six of rice. It is sifted from the salt and something less than a pound of wheat flour added to bleach it. Every boat on the Indus is provided with a deep wooden mortar formed of the hollow trunk of a tree. The boatmen buy grain in the husk because it is cheap and beat it in the mortar with a club to separate the chaff.

Meer Roostum obliged the milkmen of Roree to dispose of milk at $2\frac{1}{2}$ pys a seer, but on their threatening to go over to our camp, allowed them to sell it at 3 pys. At Sukhur the price formerly was 2 pys a seer, and doubled in 1839. Curds (*Duhee*) continued at the old rate of 2 pys. Ox and Cow beef sold formerly at 2 pys a seer in Roree, and latterly at $2\frac{1}{2}$, and goat's flesh rose from 5 to 6 pys. The beef and mutton killed in camp for the troops, was extremely lean and tough, and hardly eatable, when cooked in a common way, nor was this surprising as the Sind butchers feed their sheep and cattle on the refuse of stables, and do not give them grain and very rarely Kurbee (the stalk of *joowara* and *bujra*.)

Labourers and other poor people, eat twice a day, in the morning and evening, and consume $\frac{2}{3}$ of a seer of wheat or *joowara* flour, and one pys worth of *bor*, a condiment made of fish, spinach, or pulse. To prepare *bor* the fish is cut in pieces and thrown into boiling water, and onions, black pepper, coriander seed, turmeric, and pomegranate seeds, are added as seasoning. At present (1839) $\frac{2}{3}$ of a seer of wheat or *joowara* flour costs

3 pys, so that including the price of *bor*, a poor man consumes two pence a day. Labourers earned high wages in our camp and could afford to purchase comforts, but they had been so little accustomed to possess cash beyond their daily and pressing wants that they spent the surplus improvidently. After working a few days they absented themselves, without leave, for a week, and squandered their earnings on hemp juice and tobacco. They returned to ask their employer's forgiveness and to resume their labours, but followed again the same improvident course when they amassed a little money.

The food of a Moosulman of the better class costs about a rupee a day, and consists of :

	<i>Pys.</i>
1 lb. Rice,	3
1 lb. Wheat Flour,	2½
1 lb. Goat's Flesh,	4
1 lb. Ghee or Clarified Butter,	8
2 lb. Butter Milk,	4
¼ lb. Butasha,	4

25½

The family eat half about sunrise and the other half at noon, and a third meal, consisting of the same quantity, at the first watch of the night. A Zumeendar of Sukhur of my acquaintance, spends $\frac{3}{4}$ of a rupee a day on food, and his servants eat what is left. Hindoos live more frugally.

Poor people eat with their food a large quantity of chillies which they pound in a mortar with an equal quantity of coarse salt, and add some oil to diminish their fiery taste. Three pys weight of whole chillies are sold for a copper pys, and half the quantity pounded for use. Fish is dressed with linseed oil and a variety of spices, and the lower orders grill the entrails on wood ashes and eat them with salt.

There is little in Sindian cookery to tempt an epicure who has tasted the delicacies of a Parisien *restaurateur*, or the royal kitchens of Dilhee and Lucknow. I shall give the reader an idea of their cookery by describing a banquet at Sukhur in 1839 to which about two hundred guests were invited. Sher Moohummud, a great *savant* of Roree, gave the dinner to the principal tax gatherer of Khympoor, who sent a *nuzzur*, exceeding the expense of the entertainment, which cost about eighty or ninety rupees. He and she goats were cut in pieces and stewed to rags in large copper cauldrons; and salt, garlic, turmeric, blackpepper, cocoanuts, onions, and the seeds of black cummin, coriander, and anise

were pounded and mixed with the meat and some ghee added after it was removed from the fire.

Another dish consisted of rice served in the water in which it was boiled, and seasoned with salt, ghee, and lime juice.

A third dish, called I think *Rukhta*, was made of white pumkin cut in small slices, parboiled, and thrown into about eighty pounds of *duhee* or coagulated milk, and served with cayenne pepper, salt, onions, and garlic. Every one was helped to a small cup of *rukhta*. The rice was thrown into large earthen platters each capacious enough to allow eight or nine persons to sit round it, and the meat was heaped on the rice and a little *rukhta* poured over it. The Company dined in the open air and were much scattered. Some sat on mats and blankets they brought with them, and the greatest number on the bare earth. It would have been pronounced a shabby banquet in India. According to a Sindian custom, each groupe before they drew to the platters, looked cautiously round, to ascertain if an enemy not bidden to the feast, was watching them. They devoured the meat in unseemly haste and it was over in about an hour.

The Belooch, Puthans, Moghuls, and other northern tribes, settled in Sind, are tall and well made, and the upper classes have dark brilliant eyes and expressive features. They as much surpass the inhabitants of Oude and the Delhi Territory in bulk and stature, as the latter do the tribes of Bombay, Bengal and the Konkan. In complexion, they are fairer than the Bengalees but less so than the Moosulmans of Northern India. They let their beards grow to a great length regarding a well covered chin as a handsome and becoming ornament of the face. Asiatic monarchs, like the early French Kings (the Franks,) never allow the scissors to touch their beards, and regard the beard as a mark of freedom and illustrious birth, and cultivate and prize it exceedingly. The Belooch also permit the hair of their heads to grow in wild profusion which I need not observe, is expressly prohibited by the Koran, for a Moosulman is enjoined to leave only a small tuft of hair on the crown of the head to afford Moohummud a hold in lifting him to Paradise.

The beards of the Belooch, like those of other Asiatic faces, are mostly black and the practice of staining them as they turn grey, is almost universal. An extract from the leaves of *hina* (*lawsonia inermis*) and indigo are used for the purpose, and if not renewed at proper intervals, changes the beard of a fiery red or deep orange colour. It is much the custom, among the Persians and Afghans, and they assist the operation by the vapour bath.

Hina leaves are ground in a mortar or stone hand-mills and immersed an hour in warm water until they acquire the consistency of thin paste. Women mix it with the paste and apply it to their riuglets to conceal the ravage which time has made with them, and it gives their hair a disagreeable smell.

The *hina* paste is strained and applied to the beard with paper and cotton cloth which are passed under the chin and over the head, and a warm situation, particularly a hot bath, favours this troublesome operation. It is left on four or five hours to produce a good colour. Afterwards the beard is thoroughly washed with warm water, combed clean and dried, and covered with a decoction of indigo leaves made into paste like *hina* and tied on the beard for double the period. It is generally put on at night and washed off in the morning, and the beard combed and cleaned. The dye should be applied once a week, to procure the colour, but is not usually renewed oftener than the tenth day.

The national head-dress is a circular cap called Shuhzadpooree. It is about eight inches in height and made of silk or cotton thread of several colours according to the prevailing fashion and taste of the wearer. Scarlet was the favourite colour at Hydrabad in 1839. The crown is flat with a sharp projecting rim, and of a different colour from the rest of the cap, and sometimes covered with brocade. A gay coloured band, the depth of the cap, goes round it with the exception of two inches in the front which is of another pattern. Caps are made upon very small blocks, and worn on the brows so that they just cover the crown of the head. They cost from six annas to five rupees, and common people wear one, three months, or until the threads fall in pieces, and are discoloured from dirt and grease.

Many Puthans, Moghuls and other foreigners, who have settled in Sind, adopt the Belooch cap, and dress to identify themselves with the conquerors of the country and to procure respect and security from oppression, and even Hindoos, in Government employ, wear it. The Ameer occasionally presents his servants with a cap or a dress, and they could not neglect his gifts without giving offence.

Suyads sometimes wear a three-cornered cap made of rich crimson silk sprigged with flowers, or covered with gold brocade, and a handsome one may be purchased at Shatta for 4 or 5 rupees. They are stiffened with paste or buckram and fold up like an English cocked hat.

A few Belooch have adopted the turban, but they usually prefer the national cap. Poor Sindees have cotton turbans either white or dyed

blue with indigo. They take from six to twenty yards of cloth about sixteen inches wide, and cost from 6 annas to 2 rupees.

Slippers are of brown leather made of a peculiar form, and the soles stitched together with cotton thread. They cost half a rupee per pair, and an inferior kind six and seven annas. Poor tradesmen and manufacturers change their shoes every six months and sometimes twelve months.

The upper garment (*cholo*) of the Sindees, is a loose shirt of white cotton similar to the smock of an English ploughman : it has a low collar fastened over the right breast and reaches below the knee, and takes six or eight yards of cloth. The pastoral tribes of the desert and poor farmers, usually dye the frock blue, and other classes a sort of yellowish brown colour with extract of turmeric and pomegranate shells. Some wear a loose waistcoat with a cotton sheet (*bochum*) twisted over it, containing from six to twenty yards of cloth according to the means, and taste of the wearer.

Their trousers or drawers are of course cotton stuff usually dyed blue, made very full, low in the seat, and rather tight above the instep. Some reach only to the small of the leg and are fastened at the loins with a running string. Tradesmen and manufacturers allow themselves four or six suits of clothes in the year.

The higher ranks wear round the waist a *loongee* made at Thatta of mixed silk and cotton threads of gay colours. The middle ranks have *loongees* of white cotton with blue cross bars six or seven cubits long with a border of crimson silk and cotton mixed, and the poor gird their loins with a bit of coarse cotton cloth.

Some women of the lower class wear drawers (*Sootun*), but ladies who are behind the curtain and do not quit their chamber, wear petticoats confined at the waist with a string. Cotton drawers are sometimes striped red, made full to the knee, and tight below it, leaving an opening scarcely wide enough to admit the foot, and falling under the heels.

Their body is cased in a sort of spencer or boddice with short tight sleeves : it reaches to the waist and is tied above and below the bosom with strings, leaving the back exposed. The spencer is dyed brown, red, or dark blue, and sometimes prettily worked and spotted with coloured silks and covered with talc spangles fixed on their leaden medallion, which are also used to decorate mantles and petticoats. They are put on with gum and other adhesive substances.

The following list exhibits the wearing apparel and its cost, of a landholder of the middle class, and of Government officers, in Khyrpoor.

	Rs. As. Pys.		
<i>Cholo</i> or Shirt of coarse cotton called 'Udhotur' of Khypoor manufacture, 20 cubits, at 28 cubits per rupee . . .	0	113	0
<i>Bochun</i> or mantle of the same material 28 cubits long . . .	1	0	0
<i>Sootun</i> or Drawers 11 cubits at 9 cubits per rupee . . .	1	3½	0
<i>Loongee</i> of striped cotton	2	8	0
Shahzadpooree cap of yellow silk and crown of red cotton. . .	1	0	0
Pair of Shoes	0	8	0
	<hr/>		
	Rs. 6	15½	0

The three first articles on the list are sewn at home, and the usual allowance is six suits in a year which cost . . .	17	11½	0
Six Caps	6	0	0
Four pair of Shoes	2	0	0

Total cost of a dress annually about £ 2-11.	Rs. 25	11½	0
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About 4s. 6d. are sufficient to provide a poor person such as stone-cutters, silk and cotton weavers, washermen, leather cutters &c., with a suit of wearing apparel, and women of this class may be clothed for 4 or 5 shillings.

A man requires :—

A cotton <i>chola</i> 12 cubits 6 annas, sewing 1½ anna . . .	0	7½	0
A cotton <i>Bochun</i> 18 cubits 9 annas, sewing 1 anna . . .	0	10	0
Drawers, of cotton cloth 10 cubits long 1½ cubit wide 5 annas, sewing 1 anna	0	6	0
Cap 6 annas; or cotton turban 12 cubits long, the same valuse	0	6	0
Shoes 7 annas per pair	0	7	0
	<hr/>		
	Rs. 2	4½	0

<i>Chola</i> 4 per annum, at annas 7½ each	1	14	0
<i>Bochun</i> 4 per annum, at annas 10 each	2	8	0
Drawers 4 per annum, at annas 6 each	1	8	0
Cap 4 per annum, at annas 6 each	1	8	0
Shoes 2 pair per annum at annas 7 each	0	14	0

About 16s. 6d. per annum,	Rs. 8	4	0
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A woman requires :— Rs. As. Pys.

A cotton petticoat (puro), 24 cubits golang and 2 cubits wide							
1 rupee, sewing 2 pys.	1	0	0	Four per annum	4	3	2
A Boddice (<i>Choolee</i>) of cotton cloth 4 cubits long and $1\frac{1}{4}$ cubit wide, 2 annas, sewing 2 as.	0	4	0	ditto	1	0	0
	1	4	2				

A mantle or sheet (*Chuddur*) 20 cubits long. It is thrown over the head, envelopes the figure, and descends to the heels, cost 12 annas, sewing 1 anna

	0	13	0	Four per annum.	3	4	0
Shoes 7 annas per pair	0	7	0	Two per annum.	0	14	0
	2	8	2		9	5	2

Drawers take about 9 cubits of cotton cloth, $1\frac{1}{4}$ cubit wide and cost 8 annas and 1 anna sewing

Clothes are generally made by the females of a family. Women sometimes wind a cloth or mantle round the body and veil their features like Indian women.

The Ameer's dress costs about £ 7 10, and he is said to allow himself four suits a month. The cast off suits he gives to his servants

A Chola costs	3	0	0
Drawers	10	0	0
Loongee	50	0	0
Roomal or Handkerchief	1	0	0
Cap	10	0	0
Shoes	1	0	0
	Rs. 75	0	0

The dress of ladies of the Ameer's Haram costs about the same, and they wear also a silk *Uorungshahee* of Persian or Toorkish manufacture, worth 30 or 40 rupees. The best *Uorungshahee* are usually red and studded with emeralds, pearls, and other precious stones arranged in patterns. There are some in the Palace valued at 2,000 rupees, and Meers Roostum and Ali Morad have each one said to be worth 5,000 or 6,000 rupees.

So strong is the women's passion for jewels and ornaments, that even the poorest lay by a trifle out of their scanty earnings to gratify it, and I recollect seeing a female at work in a field at Sukkur covered with filthy rags, who had ornaments on her person worth twenty rupees. A triple amulet of silver round her neck cost alone six rupees.

The gold and silver ornaments worn in Khyrpoor and Moghulee, are more remarkable for their weight and number than delicacy of finish.

The *Chotee Phool* is a medallion for the back of the head.

Tiko. A large oval forehead ornament of gold or silver, painted three or four colours usually red, green, and yellow. A similar ornament is worn in India by shop-keepers wives and prostitutes, but not by peasants. The peasant women of Sind wear the *tiko* at feasts and holidays, and fix it on the middle of the forehead by gold or silver chains (*daonree*), which are brought across the forehead and fastened with hooks behind the ears, or to the crown of the head. A gold *tiko* cost 32 rupees and a silver one 1½ rupee.

Punra from seven to sixteen ornaments worn in the rim of the ear with pearls or silver beads.

Nusbee worn near the orifice of each ear.

Joomuk suspended before the ear to cover the orifice.

Chupla gold or silver wires set with about a hundred small turquoise stones worn in the middle of the rim of the ear.

Boolu a small ring set with pearls worn through the cartilage that divides the nostrils.

Nut ring generally set with three pearls worn in the right nostril. It is always gold, and the lowest half swells into a crescent form. The gold costs from 5 to 9 rupees. A poor woman will have a nose ring worth ten rupees. The gold costs five and a pair of pearls five. Country people have a ludicrous description of nose ornament resembling in shape and size the two handed instrument used in India to cut betel nut.

Kundhee necklace of gold or silver beads strung on silk threads and falling below the bosom and fastened to an angular barrel-shaped ornament (*poottle*.)

Taweez, three square amulets of gold or silver, sometimes coloured green or red, suspended round the neck by silk threads.

Sookree, an oval ornament suspended round the neck and below the bosom.

Zunjeeree, a double chain which is passed over the neck and across the loins and attached behind and before to oval medallions, and falls below the bosom.

Chelkee, a waist chain.

Dorhir, armlet of three barrel shaped ornaments like the *pootlo*, worn below the elbow.

Banhee, long bangles of embossed gold or silver, worn from the wrist to the shoulder leaving only a small opening at the elbow joint, so that the arm is in fact cased in metal. Ivory armlets are turned on a lathe and sold by weight, and a sufficient number to reach from the wrist to the shoulder may be purchased for 25 rupees. They have a clumsy and disagreeable effect on the sable skins of the women.

Moree, pointed bangle of gold or silver fastened with silk threads on the wrist.

Wadalu, *Mungloo*, and *Kungur*, three kinds of bangle for the wrist.

Moondree, seal rings worn on the fingers. A chain (*wung*) is attached to the ring on the middle finger, carried round the thumb and fastened to the bracelet.

Wehr, ring worn on the fore finger of the right hand.

Acenu, Mirror ring worn on the thumb.

Kuriyon, heavy silver anklets each weighing from 40 to 100 rupees.

Ghinguroon, anklet worn below the *Kuriyon* and fastened with an ornament (*noora*.)

Paeenzeb, silver anklet worn below the *ghinguroon*.

Ungoothee, angular medallions fastened on the toes by rings and sometimes ornamented with blue enamel.

Men of the middle class wear a gold or silver finger ring with a white or red cornelian or other coloured stone, set in it. If set in gold it costs 8 or 9 rupees and 8 or 9 annas in silver. The stone costs a rupee.

Boys wear a ring (*walee*) through the lobe of the ear; an ornament (*Kewatee*) in the rim of the ear; or *Kungna* or bracelet on the wrist, and sometimes seal rings (*moondree*) on the fingers.

*Proceedings of the Asiatic Society, Wednesday Evening,
2d June, 1841.*

THE HON'BLE SIR E. RYAN IN THE CHAIR.

Mr. S. G. T. Heatly was proposed a Member by Dr. J. T. Pearson, seconded by the Secretary.

Books received for the Library of the Asiatic Society, 2d June, 1841,

Annals and Magazine of Natural History, Nos. 37 to 40, December, 1840 to February, 1841,	4
The Calcutta Monthly Journal, for April, 1841, 3d Series, No. 77, .	1
The London, Edinburgh and Dublin Philosophical Magazine, 3d Series, vol. 17, Nos. 112 and 113 and vol. 18 No. 114, London, 1840-41,	3
Yarrell's History of British Birds, January 1841, part 22,	1
Ouchterlony's Mineralogical Report, Madras, 1841,	1
Dollard's General and Medical Topograghy of Kalee Kemaon and Shore Valley, Calcutta, 1841,	1
Cuvier, Histoire Naturelle des Poissons Tome 15, et Planches, Nos. 389 à 420,	3
Journal des Savants, Septembre, Oct. et Nov. 1840,	3
Tassy, Doctrines et Devoirs de la Religion Musulmane, tires du Coran Paris, 1840.....	120, .. 1
Antiquitates Americanæ, Hafniæ, 1837, (in Danish and Latin,) 4to,..	1
Samlede Afhandlinger of R. K. Rash Kobenhavn, 1838. Fredil del, 8vo.	1
List of Mammalia, Contained in the Museum of the East India Company, (for distribution,)	
Pamphlets in Chinese Characters,	2

Read the Report submitted by the Officiating Curator for the month of May last already published in the body of the Journal.

Read Letter, from Mr. E. Blyth, dated, London, 30th March, 1841, apprising conclusion of an arrangement for his passage to India per '*Larkins*,' and expressing obligations for conferring upon him the appointment of Curator to the museum of the Asiatic Society of Bengal, also forwarding abstract of a memoir on the wild sheep.

Read the following correspondence with Professor Wilson.

EAST INDIA HOUSE, 31ST MARCH, 1841,

To

The Secretary of the Asiatic Society of Bengal.

SIR,

I have the satisfaction to inform the Asiatic Society, that at last the travels of Messrs. Moorcroft and Trebeck have been given to the public. The society is no doubt aware that the work was printed, and even reviewed three years ago, at which period it was expected by the publisher that the map would have been completed. The unaccountable and unjustifiable tardiness of Mr. Arrowsmith in the preparation of the map has been the sole cause of the delay.

The Society was apprised as soon as Mr. Murray engaged to publish the work of the nature of the arrangement, which had been entered into with him. It was stipulated that the Society would guarantee him against loss in case the book should not meet with a ready sale, either by payment of the deficiency or by paying for such copies as they might desire to possess. If the book were sold, a certain number of copies (40) should be placed at the disposal of the Society. Mr. Murray has sold all the copies except the 40 thus reserved. They have been handed over to me. A promise was given to Mr. Trebeck, the brother of the traveller, that of the copies so received by the society, 12, should be made over to him. As he was recently in town the 12 sets have been delivered to him. Of the remaining, 10 have been sent to the Society on board the *Tamerlane*. I have distributed six others in the following manner :

- 1 To the Royal Society.
- 1 To the Royal Asiatic Society.
- 1 To the Royal Society of Edinburgh.
- 1 To the Asiatic Society of Paris.
- 1 To the University of Bonn.
- 1 To the Royal Geographical Society.

They have been presented in the name of the Society. There thus remain 12 copies to the appropriation of which by myself I trust the

Society will not object, as I had much trouble in preparing the book for publication, having been obliged indeed to re-write the whole of it. Of these 12 copies, several will be presented to public Libraries. Of those sent to India, I take the liberty of suggesting that a copy should be sent to the son, and another to the daughter of Mr. Moorcroft. They are both in India. The son is, I believe, in the Madras Army, the daughter is married to an officer in the Bengal army. I am not able to furnish more particular directions as I omitted to ask Mr. Trebeck when I saw him, and I do not know where to apply to him; but it will probably not be difficult to obtain the necessary information in Bengal, from persons connected with the houses of Palmer and Co. and Cruttenden and Co. with whom Mr. Moorcroft was in correspondence.

Mr. Blyth has taken his passage in a ship that is to sail at the end of this month, I am in hopes that the arrival of the mail will bring the Society's approbation of the measure of making him an advance for outfit and passage, as without it, he could not have joined the museum.

I believe I have already acknowledged the receipt of the Bill for £200, for Mr. Prinsep's bust. The charge is 200 guineas or £210, the difference can be remitted hereafter. In the case of my own bust I paid it myself. The Society may do as it pleases about the repayment. Mr. Prinsep's bust has been modelled, and will I hope be as good a likeness as can be expected under the circumstances under which it is made; it will no doubt be worthy of the reputation of the Artist.

I am, &c.

(Signed) H. H. WILSON.

To

Professor Wilson.

SIR,

The Hon'ble the President and Committee of Papers of the Asiatic Society of Bengal desire me, in reply to your letter of 31st March last, to state that they have duly received from Mr. Blyth himself notice of his embarkation for Bengal to assume the office of their Curator. The Local Government have called upon the Society to reimburse the Court of Directors in the sum of £150 advanced to that gentleman. The Society, I am desired to observe, was not consulted before this advance was made, but the local Government have consented that payment shall be deferred until Mr. Blyth arrives.

Notice has been given to our Agents, Allen, Parbury and Co. to pay to your order £10 being the balance due on account of your bust, and we regret that your should have been called on to advance this sum on account of the Society. The Society is happy to say that the funds available for that of Mr. James Prinsep are ample; its members desire me to return you their thanks for the continued interest which you have evinced on this subject.

The Society observes with satisfaction that the travels of Messrs. Moorcroft and Trebeck, ably edited by yourself, have met with so ready a sale. The period of three years however, which elapsed between the printing and publication of the work might, in the opinion of the Society have allowed of a definite reference to it on the subject of the disposal of the 40 Copies to which by the terms of an ample and hazardous guarantee it was entitled. The Society anxious to improve its connections with scientific bodies on the continent of Europe, would have availed itself with readiness of the occasion thus offered, of making presentations on its own immediate account of a work published only by its interposition.

40 Copies of Moorcroft's Travels due to Asiatic Society of Bengal.

12 Given under promise (of the Society ?) to Mr. Trebeck's Brother.

2 Intended for Mr. Trebeck's son and daughter.

6 Presented by Professor Wilson to learned bodies.

12 Taken by Professor Wilson.

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8 For the Asiatic Society of Bengal.

The receipt of the 8 copies sent to the Society will be acknowledged in due course.

I have, &c.

(Signed) H. TORRENS.

Secy. to the Asiatic Society.

*Asiatic Society's Rooms,
Calcutta,
The 8th June, 1841.*

The Secretary presented to the Society a valuable collection of coins, consisting of the following :

List of the Coins ; presented to the Asiatic Society, by H.W. TORRENS, ESQ.

I. Greek and Carthaginian Coins in 5 packets :

- | | |
|--------------------------------|-------------------------------------|
| 1. Ptolemy (copper) | 4. Five coins (copper) of Carthage. |
| 2. Ptolemy (copper) | 5. Silver coin of Carthage. |
| 3. Two coins of Melite (Malta) | |

II. Bad Roman copper coins :

One packet, containing 35 various coins.

III. Roman Copper coins in 14 packets :

- | | |
|------------------|---------------------------|
| 1. Minimus. | 8. Carus. |
| 2. Tiberius. | 9. Maximianus. |
| 3. Antoninus. | 10. Licinius. |
| 4. Faustina. | 11. Constantinus. M. (11) |
| 5. Lucilla. | 12. Constantius (6) |
| 6. Gordianus (2) | 13. Magrentius. |
| 7. Alexander. | 14. Decentius- |

IV. Copper coins of 12 Rajahs of Cashmere in 12 packets.

- | | |
|-------------------|--------------------|
| 1. Taga Deva. | 7. Kalasâ Rajah. |
| 2. Sangrama. | 8. Sankara Vermma. |
| 3. Sassala. | 9. Ananta Rajah. |
| 4. Diddâ Râni. | 10. Taya Sinha. |
| 5. Kshéma Gupta. | 11. Kersha Rajah. |
| 6. Gopala Vermma. | 12. Sugandhâ Râni. |

V. Copper coins of some of the Mussulman Kings of Dehli.

1. Three coins, Julal Shah, A.H. 841, (scarce.)
2. Four coins, Naser ood deen Mahmood, I.A.H. 643 to 644.
3. One coin, Noosrut Shah (usurper,) A.H. 790 to 800, (very scarce.)
4. Four coins, Mahomed Tughlaks, A.H. 725 to 752.
5. Four coins, Tughlak, A.H. 721 to 725.
6. Four coins, Kutbood deen Moobârûk, A.H. 717 to 721.
7. Four coins, Feroz 3rd, A.H. 752 to 790.
8. Four coins, Shums ood deen Iltamsh, A.H. 607 to 633.
9. Three coins, Aboobukr, A.H. 791 to 793, (very scarce.)
10. Four coins, Mahomed, A.H. 837 to 850.
11. Four coins, Mahomed Adil, A.H. 960 to 962.
12. Four coins, Islâm Soor, 952 to 960.
13. Four coins Ala ood deen Masâood, A.H. 640 to 643.
14. Four coins, Naser ood deen Mahomed, 2d A.H. 796 to 816.
15. One coin, Sikander Humayun, A.H. 796, (extremely scarce.)
16. Four coins, Bhatool, A.H. 854 to 894.
17. Four coins, Mubaruk, 2d A.H. 824 to 837, (very scarce.)
18. Four coins, Naser ood deen Mahomed, A.H. 793 to 796.
19. Four coins, Ghias ood deen Bulbun, A.H. 664 to 685.
20. Four coins, Moaz ood deen Kai-Kobâd, A.H. 685 to 688.
21. Four coins, Ala ood deen Mahomed. A.H. 695 to 716.

22. Four coins, Shahab ood deen Mahomed bin Sam, A.H. 588 to 602.

23. Four coins, Sheer Shah Soor, A.H. 947 to 952.

24. Four coins, Jelal ood deen Feroz, A.H. 688 to 695.

A beautiful set of casts of coins by V. Tregear Esq. was also presented.

Read the following List of Silver Coins of the Mehomedan Kings of Delhi purchased from Lieut. A. Cunningham by the Society.

Silver Coins of the Mahummudan Kings of Delhi.

PUTHANS.

A. H.	A. D.		Size.	Price.		Remarks.
				R.	A.P.	
588.	1192.	Shahab ood deen Mahummud, 1	Rupee	10	0 0	Type. Unique & unpublished.
643.	1245.	Naser ood deen Mahmood, . 1	do.	3	0 0	Common.
664.	1265.	Ghias ood deen Bullum, . . 1	do.	5	0 0	Rare.
685.	1286.	Moozood deen, 1	do.	7	0 0	Very rare.
688.	1289.	Jelal ood deen Feroz, . . . 1	do.	5	0 0	Rare.
695.	1295.	Alaooddeen Mahummud, . . 1	do.	2	0 0	Very Common.
717.	1317.	Kutt ood deen Moobaruk, . 1	do.	7	0 0	Very rare.
		Ditto, 1 $\frac{1}{2}$	Rupee	1	0 0	Common.
721.	1321.	Ghias ood deen Tughlak, . . 1 $\frac{1}{2}$	do.	2	0 0	Rare.
						Type.
725.	1324.	Muhummud Tughlak, . . . 1 1	Rupee	10	0 0	Unique & unpublished.
		Ditto, 1 $\frac{1}{2}$	do.	1	0 0	Common.
947.	1540.	Sheer Shah, Fareed ood deen, 1	Rupee	2	0 0	Very Common.
952.	1545.	Islam or Suleem Shah, . . 1	do.	2	0 0	Common.
13 at Rs.				57	0 0	

MOGULS.

963.	1556.	Akber, Roundjul julaleh, . .	Rupee	2	8 0	
		Ditto, Squarejul julaleh, . .	do.	2	8 0	
		Ditto, Char yareh rupee, . .	do.	2	8 0	
1014.	1605.	Ichaugir Square, in beauti- ful preservation, . . . }	do.	2	8 0	
		Ditto, Round, }	do.	2	8 0	
1037.	1628.	Shah Jehan, }	do.	2	8 0	
		Ditto, }	do.	2	8 0	
1068.	1658.	Murád Buksh, }	do.	5	0 0	Extremely scarce.
1068.	1658.	Aurangzeb, }	do.	2	8 0	
1118.	1707.	Behadur Shah, }	do.	2	8 0	
1124.	1713.	Jehandar Shah, }	do.	4	0 0	Very scarce.
1124.	1713.	Feroekhser, }	do.	2	8 0	
1131.	1719.	Rafi ud darjât, }	do.	10	0 0	Unpublished extreme- rare.
1161.	1749.	Ahmed Shah, }	do.	2	0 0	
1167.	1754.	Alumgir Sain, }	do.	2	0 0	
1173.	1759.	Shah Jehan Sain, }	do.	15	0 0	
1173.	1759.	Shah Alum, }	do.	1	8 0	
1221.	1806.	Akber Sain, }	do.	1	8 0	

18 Coins, 66 0 0

13 57 0 0

31 123 0 0

N. B.—The Mogul rupees are all in the most perfect preservation, having been selected out of 200 Coins at Delhi, at 2 Rupees each.

The Secretary submitted a sample of the Tooloot paper presented by Mr. John S. Torrens. In forwarding it that Gentleman writes, 'I was reminded of it the other right on hearing the Curator speak of the inconvenience caused by the rapid destruction of the labels, on the various specimens in the Society House. This paper is prepared at Nuddea, where it has long been made use of by the Brahmin's in their writings. It is proof against insects, and I am afraid to say the age of some writings on it, which have been produced before me in a perfect state of preservation. I am also told that moderately sized boxes, lined with it will secure papers deposited in them from the attacks of insects; and from some experiments, I have myself made, I should think the paper would be of much use in libraries by merely pasting a slip of it down the backs of books between the leather, another stitching. In records in public offices, it would doubtless be of use.'

'It may be as well to mention that it is impregnated with Sulphate of Arsenic.'

Dr. H. H. Spry presented on behalf of Mr. R. N. C. Hamilton, Commissioner at Agra, a beautiful specimen of the musk deer of the Himalya.

Mr. Hamilton in sending it, writes, 'I have sent to you a skin of a musk deer, quite perfect, the head is good, but from having been badly packed in the hills beyond Almorah, it is crumpled up. I know not whether it will be acceptable to the museum of the Asiatic Society, but if so, will you present it?'

The Hon'ble H. T. Prinsep Esq. presented several Chinese pictures and books brought round in one of Aga Kurboloi Mahomed's Ships, which had been engaged in going to the northward for cattle for the China expedition.

Read letter of 16th April, 1838, from Mr. C. C. Rafer, Secy. Royal Society of Northern Antiquities, Copenhagen, offering the establishment of a connexion between that institution and the Society of Bengal, and with this view presenting a copy of the 'Antiquities of America before the time of Columbus.'

Ordered that the civility be reciprocated by the presentation of a copy of the Transactions of the Asiatic Society, and that Mr. Rafer be requested to enroll the Society as subscriber to the publication.

Read the following letter from Mr. Acsoma Korosi of 22d May, 1841.

TO H. W. TORRENS, ESQ.

Secretary to the Asiatic Society of Bengal.

SIR,—I beg to acknowledge the receipt of your letter dated on the 15th instant, acquainting me with the resolution of the Committee of papers, in answer to my letter to you.

I feel greatly obliged by the Asiatic Society's kindness, generosity and liberality towards me, in having accepted my resignation, in having declined to accept the money, which I most willingly and respectfully offered to repay, and in having permitted me to remain at this place until my departure from Calcutta, granting me in the same time a monthly allowance of 50 rupees for which I return herewith my respectful thanks, and beg to be kindly excused from accepting the offered monthly salary; since I cannot employ the money. Should I be successful on my intended journey to Tibet, to find an opportunity for improving myself in the language and literature of that country, and to procure some interesting works, I shall then take the liberty to apply to the Asiatic Society.

I sincerely declare herewith that, if not hindered by death, I intend to return again to Calcutta, and to acquaint the Society with the result of my peregrination.

I beg to remain with great respect,

Sir,

Your obliged and obedient servant,

A. CSOMA KÖRÖSI.

As. Society's Rooms,

Calcutta,

22d May, 1841.

This letter having been read, the Hon'ble the President observed that that eminent scholar was not less remarkable for the high and gentlemanly feeling which he had always manifested in his intercourse with the Society than for his great erudition, perseverance and enterprise. The expedition Mr. Csoma now meditated to Lassa would be undertaken wholly on his own resources, its object being the noble and laudable one of furthering the ends of Philological and Historical enquiry. The President trusted that should Mr. Csoma find himself in a position during his expedition into Thibet, to require aid, he would not fail to consider the Asiatic Society of Bengal as gratified by being able to lend their assistance to so esteemed a co-adjutor.

The Asoka stone bearing the Palee Inscription, forwarded by Major Thoresby. The mass of granite bearing the Asoka Inscription, fac-simile and translation of which was published in No. 95 of the Asiatic Journal, was laid in the Society's rooms for the inspection of the meeting, having arrived only four days previously. This the most ancient (B. C. 250) and one of the most valuable of the relics of Indian Antiquity in the possession of the Society, was inspected with extreme interest by all the Members present.

It is in admirable preservation, and the characters are cut with distinctness and elegance. A careful comparison with the published fac-simile shewing that it is perfectly correct. The Society have now by the intervention of that zealous antiquarian Capt. Burt, and the obliging kindness of Major Thoresby, been placed in possession of an *Original Edict of Asoka*. It is the decyphering of the character in which the Edicts of that Monarch are written, and the interesting and important historical results deduced from the interpretation of them, which have so greatly contributed to raise the reputation of the Society among learned bodies in Europe, the credit and the merit of the discovery being wholly due to the late Mr. James Prinsep.

It was suggested that on receipt of the bust of that lamented and distinguished man, the inscription now before the meeting, could not be better placed in the museum of the Society than at the foot of the Pedestal, which is to bear his effigy.

For the presentations and contributions, the thanks of the Society were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

On the Natural Products about the Pundeelah River, H. H. the Nizam's territory.—By DR. WALKER, Madras Army.

I marched from Pakhall on the 7th instant in a North-westerly direction towards Madhapore, which I reached on the 13th. I remained there for five days, when I proceeded to this place, deviating from the direct route by going ten miles up the Pundeelah river.

At Dogundah, the first stage on the march from Pakhall, so deep was the soil, that I experienced considerable difficulty in procuring a specimen of the surface rock. Upon obtaining one, I found it to consist of sienitic granite, with a considerable quantity of mica interspersed. One of those greenstone veins so commonly met with, was found traversing the rock in the usual direction from East to West to near the next stage, Korapack. Here, in some places of the plain, the granite was observed to lose its hornblende and mica altogether, and become the pegmatite of French writers. The great proneness of the felspar to decompose in this form of granite, is shewn by the brackish water of the neighbourhood; and here it may be remarked that, within the tropics, where from the great heat and other causes, there is a continual tendency to decomposition and recomposition, it necessarily appears that wells sunk in rocks containing alkali, particularly if lime is present in the soil, must ever contain water more or less impure, and that the impurity will always be found in a direct ratio to the facility with which the rock disintegrates. It must also follow as a consequence, that the older the well

is, the worse the water; for the salts that occasion the brackishness are by no means removed on their contents being drawn out, or evaporated; but adhere to the sides of the well, or being extremely soluble, as they all are, impregnate the bottom mud to some depth. May not the proverbial unhealthiness of old deserted cities be in a great measure attributable to the water reservoirs being all in the same state?

At the next stage, Gunpoora, the elevations to the right were ascertained to be of the sandstone formation, similar to that of Pakhall. The granite continued for some miles to be the surface rock; but it finally disappeared at Chintakaminah, the stage next to Madhapore, where its place was taken by the sandstone.

Between Senapore and Madhapore, the country, particularly after entering the Chinnore Sircar at Chumblepore, is exceedingly jungly. The wood jungle, which commences at the last mentioned place, consists of the trees formerly noticed in the description of Pakhall, with the addition of two or three Gardenias. Two species of *Bignoria*, the *crispa* and *quadulocularis*, the *Schrebera Swietenoides*, a species of *Cordia*, the *Strychnos Potatorum*, the *Randea dumetorum*, the *Terminalia Chebula*, two species of *Casearia* and *Celastrus raniculata*; the last a climbing shrub. Of the grains and legumes cultivated in this Sircar, there is little or no difference between them and those of Humnumkondah, mentioned in my first letter. The *Linum usitatissimum* is grown here in small quantity, but a good deal is imported from Chandah. Its oil is chiefly used by the sawyers.

A species of *Capsicum*, known in Western India by the name of Nepal chilly, is grown here. Cotton is also raised, but in very small quantity. The Goands who inhabit the hills and fastnesses of the north, use the bamboo seeds, ground to a meal, and mixed with milk, as an article of diet. Cattle, buffaloes included, present nothing remarkable. The latter, as elsewhere in other parts of India, are used for draught.

There are flocks of sheep, with the brown wool, here; it is not esteemed of much value, and is chiefly sent to Chandah in the Nagpore territory. The Goands bring in hides of the Samber* and Nilgye† for sale; the price is from eight annas to twelve annas each.

* Samber or Samur. The Indian Elk.

† Nilghye.

The principal manufacture throughout this district is the tusser or jungle silk. The tusser *breeders* are a class quite distinct from the weavers, and are either Telongoos of low caste or Goonds; the former reside principally at Chilpore, Madapore, and Chinnore. At Madapore, which may be regarded as the centre and head quarters of the tusser-breeders, there are at least seventy families.

The tusser-breeder never thinks of keeping up the breed of the insect throughout the year. When the leaf is off the tree, about the middle of March, he deems his occupation gone, and he leaves the object of his former excessive care to shift for itself, thinking of nothing but his present ease, which may be summed up in a few words, —sloth, a bare subsistence, and an occasional debauch in his nectar, *palm toddy*. But with the rains returns his toil, and some little difficulty is experienced in procuring insects for a fresh campaign. If he can gather a dozen of promising cocoons, which his experience tells him are of females, he is quite satisfied. Carefully does he watch the bursting of the cocoon, and much care does he take of its winged inmate, having previously prepared for it a house of teak leaves dried. The male is not tardy in approaching.

Impregnation takes place, the male dies, and in four days after laying her eggs, the female also. The eggs are in number about sixty, of these one-half prove abortive, while the others are hatched in ten days. The small insect is fed on the tender leaves of the *Careya sphærica*, and in six weeks spins its cocoon; the first brood are spared and allowed to burst their cocoons to supply a sufficient quantity of ova for the first tusser harvest; the same process as described is again gone through, with this exception, that the young worms are this time fed on the leaves of the *pentaptera tomentosa*, as those of the *Careya sphærica* are, by the period of the season, supposed to have acquired some influence noxious to the insect. It is during the progress of the worm, from the egg to the formation of the cocoon, that every energy of the tusser-breeder is called into action for the preservation of his charge. Every animal, footed, winged, and creeping, is said to be the enemy of the tusser grub. Ants destroy them, kites and crows prey on them, snakes devour them, and squirrels are said to make a repast of them. To protect them first from their insect enemies, the tusser-breeder ascends the Muddy tree, (*Pentaptera tomentosa*,) the

leaves of which are the insect's food ; every branch he carefully clears of the different species of ants by which they may be infested, preventing the access of others, by surrounding the trunk of the tree at its foot with ashes. The other enemies are kept off by shouting, throwing stones, firing guns, &c. Their life at this time would appear, by their own account, to be one of the most unremitting toil ; to devote themselves to which they forswear not only every indulgence, but every comfort ; and it rouses the apathetic peasant of *Telengana* to eloquence, when he recounts what privations he undergoes, what pleasure he derives himself, and what incessant labour he incurs while watching the rearing of the worm, and the perfecting of its work. The tusser butterfly is a species of *Saturnia*, probably the *aphia* described by Dr. Helfer as the most common of the native species. I send a specimen of a female moth.*

From four to five hundred of the cocoons are sold to the *Bunnyas* and weavers for one rupee ; the moth is killed by means of heat. There are three tusser harvests, one at the end of the rains, the other two in the cold season. The winding of the silk is accomplished by boiling the cocoons, separating the floss of which no use is made, and twisting eight or ten filatures from as many cocoons on the middle of the thigh with the left hand to be wound on the instrument, of which a muster is sent : this instrument the middle bar of the wood is held lightly in the hand of the workman and made to move in a semicircle. An ounce and a quarter of silk is the average daily winding of a single workman ; his wages are, at the common rate of one pice for winding the silk of fifty cocoons, about three pice a day, as he cannot wind more silk than from a hundred and fifty cocoons. The pice, however, are large, and go there by eight to the rupee.† The only dyes used for the tusser silk, as far at least as my observation or inquiry has gone, are the flowers of the palas and turmeric ; by the former the usual familiar colour is produced, by the latter a golden yellow is brought out after the threads are for some time immersed in a solution of ashes. The warp threads are stiffened with rice congee.

WAX.—A good deal of honeycomb is brought into Madhapore and Chinnore by the hill people. It is quite impossible, under the present

* This has not reached us, but it would be very curious to know, if that of Assam, described by Dr. Helfer and Mr. Hugon is the same as this of Hunumkonda. Ed.

† So in MSS.

circumstances of limited demand, to say what further supply these jungles might afford. The honey is sold for ten seers the rupee, and sent to Hyderabad. After the rains, and during the cold season, six or seven seers of wax can be purchased for a rupee.

It may here be mentioned, that the seer of both this and the Sircar of Hunumkondah, consists of fourteen thousand two hundred and twenty-seven grains, that is, about half an ounce more than two pounds. The maund is equal to twelve seers.

LAC.—The jungles in the Sircar, by report, yield this substance in abundance; but the little demand comparatively speaking, induces few traders to encourage the hill people to bring it in. It is thus impossible to say what the actual supply of Lac really might be without traversing the jungles at the proper season; but there can be little doubt that it would be ample. A specimen of it is sent.

GUMS.—East India Gum has obtained the bad fame of almost every East Indian production not under the direct superintendence of Europeans. It is called a spurious inferior article;—the cause is obvious—the collectors mingle all sorts together, and there being no one to select from the chaos they bring in, to check the admixture of good and bad, or to fix a value on the article, they go in this state to the European market with the brand of East Indian. They are soon found, like all mixtures, to be inferior, and the original prejudice acquires at once the stamp of currency, the cause of their inferiority being wholly overlooked. The value of gum depends on its whiteness and solubility. Who has ever separately tested the solubility of the Gums now sent? at least three of them are not even mentioned in botanical works?

Gum 1.—*Conacarpus latifolia*. This is used by the tusser weaver.

Gum 2.—*Terminalia tomentosa*.

Gum 3.—*Terminalia bellerica*.

Gum 4.—*Buchanania latifolia*.

Gum 5.—*Garuga pinnata*.

Gum 6.—*Cochlospermum gossypium*.

Gum 7.—*Sterculia urens*.

The two last are nearly similar in their properties to gum tragacanth, and the gum of the *Sterculia urens* was actually used for some time as a true *Astragalus* gum; there can be little doubt but that both are still constantly substituted for it.

It is difficult to say with any exactness, at what price these gums might be procured from the collectors, as the *Bunnias* are very partial to the truck system, and rarely pay in money if they can avoid it; a state of things almost natural in a country like this where money is scarce.

GUM RESIN.—Frankincense of the *Boswellia thurifera*, the olibanum of the ancients. Of this a specimen is sent. The tree is very common in the jungles.

RESINS Decamully.—This substance, formerly accounted a gum, has been fully proved to be a resin. It is the produce of three species of *Gardenia*, all exceedingly common.

I am not aware that this article is yet employed for any economical purpose, but it is a substance that certainly deserves the notice of the artisan. It is very much used in native medicine.

OILS.—Both varieties of the sesamum plant, black and white, are cultivated, and from the seeds of the *Bassia latifolia* and *Balbergia latifolia*, oils are expressed and used for common purposes. Two varieties of the castor-oil are cultivated. I made a trial of the quantity of oil that the kernel of the nuts of the *Buchanania latifolia*, (*Chirongy*,) would yield, and obtained an English pint from two seers of seed.

This is an oil seldom or ever used by the natives. If it possesses the drying quality of nut oils in general, it may become a valuable article of commerce. The kernels of the *Chirongy* nuts are purchased at Madhapore, from six to eight seers the rupee.

The oil-press by which the oil was obtained, was of the simplest construction. It consisted of two logs of teak, with a hole in the extremity of each, through which passed a stake fixed in the ground, the other two ends were left free, and rested on the bifurcation of a strong piece of timber shaped like the letter Y. This was also fixed in the ground; the kernels were placed in a small bag formed of the liber of the *Sterculia urens*; they contained about half a pound, and were set one above another at the middle of the lower beam, pressure was then made by means of rope tied round the free extremities; this was done four or five times, the position of the bags being altered each time. The whole apparatus did not cost half a rupee; by it the *Mowah* oil is always expressed in this part of the country. The oil mill is used for most of the cultivated oil seeds, and castor-oil is obtained in the usual mode, by pounding and boiling.

ARTICLES OF THE MATERIA MEDICA.

Justicia Paniculata (CREYAT).—This drug, which forms the active ingredient of the celebrated French nostrum *Droque-amere*, grows in great abundance here. It is an excellent bitter and febrifuge.

STRYCHNOS POTATORUM.—This tree is found in the jungles; the peculiar property possessed by its seeds of rendering turbid water clear, might perhaps be turned to some account in the arts. It possibly depends on Bassorine, known to be an ingredient in the seed of more than one of its congeners. The *Nux vomica* tree is very common, as is also the *Celastris paniculata*, the seeds of which yield the celebrated black oil, (*Oleum nigrum*,) of Dr. Herklots. Two or three mucilaginous roots were shown me; one of these was that of *Asparagus acerosus*, another was most probably the root of the *Curculigo orchidodes*. The *Asclepias procera* was, as usual, very common, likewise the *Asclepias pseudosarsa*, country *Sarsaparilla*. The tuberous roots of two wild species of *Dioscorea* were brought; one of these, *Dioscorea oppositifolia*, has been found to yield a good arrow-root.

DYES.—The *Oldenlandia Umbelata* (Cherwil) grows wild here, as well as in the Hunumkondah Sircar. The bark of the *Morinda exerta*, which grows in the jungle, is also employed to dye red. A suggestion lately made by Mr. Solly of London, of making extracts of dye woods and barks, would be applicable to a bulky material like the present. The *Crotum plicatum* grows in great luxuriance on the alluvial soil on the banks of the rivers.

TIMBER.—Madhapore is the great depôt for timber, chiefly teak, that is floated down by the rivers from the Nagpore country. Ebony trees are found in the jungle to the south of this. The *Schrebera Swietenoides*, the wood of which is said not to warp, grows to be a fine tree, and is abundant. All the valuable timber trees mentioned in my last letter, are to be met with.

CORDAGE.—The common Sunn plant, the *Crotolaria juncea*, is cultivated, and its fibres are made use of for many purposes as hemp. The fibres of the inner bark of two species of *Bauhinia* are twisted and used as rope, particularly by the Brinjarries; the inner bark of the *Butea superba* is also employed for the same purpose. I send a specimen of the rope made from the last.

The *Asclepias Tenacissima* of Roxburgh is found here. It is well known to yield very strong fibres, the strongest indeed of any plant

known. The fishermen in the rains collect it, beat out the fibres, and twist them for their nets. I shall endeavour, although the plant is out of season, to procure a specimen of this hemp, which I shall forward; and I have left directions at Chinnore, that a parcel be sent to Hyderabad, towards the end of the rains; at which time the plant is gathered, that a comparison be instituted between its strength and that of the various hems, whether the produce of this country or of Europe. It is also said to yield a species of caoutchouc. I propose starting from Chinnore *en route* to Cummurret this evening.

Note on Timber.

Although valuable teak is not the produce of this part of the Nizam's dominions, (for the greater part growing here is adapted solely for props and rafters,) yet as Madhapore is the great *dépôt* from which the wood is sent to Hyderabad, &c. a brief notice respecting it may not be deemed out of place. The teak (*Tectona grandis*) grows to a large size in the country to the north of Chinnore, about eighty miles distant; chiefly in the territory of the Raja of Nagpore, along the banks of the streams tributary to the Pundeelah. Other valuable timber, particularly the *Diospyrus melanoxylon*, yielding black ebony, and another species of *Diospyrus* yielding green, a *Dalbergia* called by the natives *shesum*; but which may not, however, be the real sissoo, but rather its near ally the *Dalbergia latifolia*, for from such observers accuracy the distinguishing species is not to be expected—all these different woods were floated down some years ago by the house of W. Palmer and Co., but at the present time teak, and a very small quantity of shesum, are the only kinds cut. I have merely native report as to the extent of the forests yielding these woods, but they are described as of great extent. During the dry months the teak-trees are felled—they are conveyed sometimes on carts, but more frequently by bullocks yoked to them to Eeroo, or Agree, a village fifty miles up the Pundeelah from its junction with the Godavery. Nullahs in the rains are also taken advantage of for the same purpose. It is well known, that the natives prefer the period when the moon is on the wane for cutting timber, assigning as a reason, its liability to be attacked by insects when cut at the period of the moon's increase. When we acknowledge, as is now usually done, lunar influence

on the animal kingdom, we must be slow to deny its power on the less perfectly organized vegetable, and hence we must regard this practice as not the mere result of ignorance or prejudice; but must class it in the catalogue of facts to be investigated. With teak, however, it is remarkable that no period of the moon is observed, being cut without reference to any such time, as they allege that the oil contained in it, is protection sufficient against the common casualties to which other timber is subject.

At Teroo, the teak is barked, squared, and dried. From the beginning of the rains until February it is floated down in rafts, and landed principally at Madhapore, although still a certain quantity passes on to Rajamundry and Masulipatam. The raft consists of three tiers of wood placed across each other, and firmly bound together with ropes of the fiber of the *Bauhinia parviflora* and *Butea superba*. They are conducted by persons of the bearer caste, and usually take six or eight days to reach their destination to Madhapore from Eeroo, although sometimes the voyage is accomplished in a couple of days. The timbers are there classed according to their size:—

1st.—The Mowhoont, twenty-four to thirty feet in a length, with breadth and depth of eighteen inches. A log like this requires a bandy (hackery) with from six to eight bullocks for its conveyance.

2nd.—Doolkahoont. This also is a large timber; but shorter than the preceding, and not so thick.

3rd.—Danpet. Common wood for beams and deals.

4th.—Sarmundum. A smaller timber than the last, used for the same purposes.

All other kinds are classed under *Dunta* for the larger, and *Kurry* for the smaller. The carts for conveying the wood are strong and well built; their axle trees are of the wood of the *Conocarpus latifolia*, and the wheels solid and without spokes of the *Pentaptera tomentosa*. Considering the variety of soils they have to traverse before reaching their destination, they are well adapted for their object; they take fifty days to reach Hyderabad, and it was stated to me, on what I consider tolerable authority, that the price for conveying sixty square feet of teak from Madhapore to Hyderabad, was not much under five rupees! From eight hundred to a thousand carts are annually despatched with teak from Madhapore: the Brinjarries convey the smaller kinds.

Report on the River Indus, (Sections 1 to 5.) By Lieut.
Wood, Bombay Marine.

I.—*A General View of the Indus.*

This report is confined to the navigable Indus, or that portion of the river lying between the Sea and Attock.

Throughout the whole of this distance, the river is known as the Sinde, sometimes indeed it is called the Attock, but this latter designation is local in its application. I have retained both, and apportioned them as follows :—

The Lower Sinde, or Indus, extends from the Sea to Bukkur.

Upper Sinde, or Indus, extends from Bukkur to Kalabagh.

Attock from Kalabagh to Attock.

By dividing the river into these sections, each is made to mark certain important alterations in the navigable character of the stream.

It may here be premised, that of the course of the river North of Attock, our knowledge is confessedly superficial. A few miles above that fortress the Indus ceases to be navigable ; but not before it has received in the Cabool river a tributary, that further extends the advantage of water carriage to the West,—the most important of all directions.

Source.—To what Lieutenants Burns and Macartney have written on the subject I have nothing to add, unless Moorcroft's travels settle the question. The source of the Indus is still a problem to be solved.

In the plain above Attock, the Indus is divided into many branches, but abreast of that fort they all unite. One deep, narrow, clear, blue stream, shoots rapidly past, and at once entering the hills, disappears from sight. Among hilly groups it winds to Kalabagh. At Mukkud the channel widens, and the expanded river flows quietly forwards with a lessened velocity, and a reduced depth. On escaping from its rocky bed the river enters a level country, through which it winds onward to the sea. Its boundaries are now those of the valley ; the Soliman mountains are on one side, and the Indian desert on the other.

Length of Course.—From the Sea to Attock, the distance in a straight line is 648 miles.

By the River it is increased to 942 miles.

Breadth of the Stream.—The width of the surface water in the dry season, varies from 480 to 1600 yards; the usual width is about 680 yards.

Depth.—When the river is in full freshes twenty-four feet; but in an opposite season of the year, nine, twelve, thirteen, and fifteen feet are the usual maxima of its soundings. The greatest depth of water in the Indus occurs between Kalabagh and Attock; one hundred and eighty-six feet has been here sounded.

Velocity.—Seven knots an hour in the freshes, and three when the river is low. It is scarcely necessary to remark, that the three last items are very inconstant. At no two places are the measurements exactly alike, nor do they continue the same at one place for a single week. A more particular account of these will be found under the next head.

Fall per mile.—From Attock to Kalabagh, 20 inches.

Ditto Kalabagh to Mittun, 8 ditto.

Ditto Mittun to Sea,* 6 ditto.

Discharge per second.—Cubic feet Maximum—

in August, 446,080

Maximum in December, 40,857

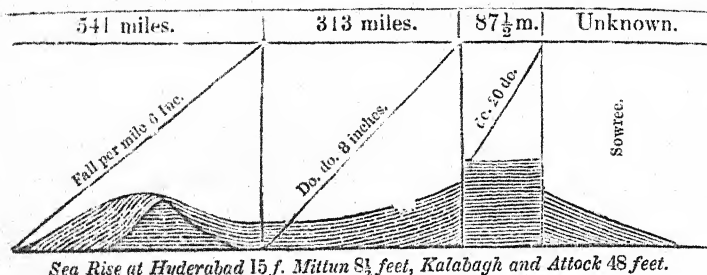
Annual Discharge.—5,383,600,934,400—or 150,212,079,642 tons avoirdupois.

Power of Transport.—Rolled pebbles do not occur in the bed of the Indus below Chandia-ke-kote, a village five miles South of Kalabagh. Above Kote, though not below it, the sand of the Indus is searched for gold. The precious mineral is also found at Dera Ismail Khan; but not in the river.

It is washed down by the rains from the Soliman mountains. Pebbles also occur at a certain spot in the river below Hyderabad, in Lower Sind; but they can be traced to hills in the neighbourhood.

Height of the River's Banks.—Assuming for the purpose of explanation that the source and the embouchure of the Indus are upon the same level, the river in its long course may be said to have two maxima of rise. These are shewn in the following sketch, where the measurements are those of the stream when in full flood.

* The fall of the river from Mittun to the Sea is from Captain Burnes' Memoir of the Indus.

Distance by the River.

The rise between Kalabagh and Attock cannot be called natural ; it is caused by the contracted bed, into which the stream is here thrown among the mountains. The rise at Hyderabad is the result of a carefully kept register daily ; but at the other places, this item has been reduced from an examination of the river's banks, and the best information I could procure.

Colour and Temperature.—To Dera Ismail Khan, the water of the Indus is of a lead colour ; below that town it becomes of a dirty whitish yellow, tinged with red. In the freshes the red tint is heightened ; but the general colour continues the same.

Between Attock and Mittun, all the streamlets that fall into the Indus are of a bright red ; save the Hurroo and Toe, which have pebbly beds and clear water.

Temperature of the River.

Months.	Air.	River.	Remarks.
February,	69° 2'	64° 2'	Noon observations in the parallel of 24° 0' North.
March,	90° 0'	78° 0'	
April,	97° 0'	81° 0'	
May,	100° 0'	84° 0'	
June,	101° 0'	87° 0'	
July,	95° 5'	88° 0'	
August,	95° 7'	88° 0'	
September,	94° 5'	86° 0'	

II.—Navigable character of the Indus.

Between the Sea and Attock the facilities for navigation are not everywhere equally great. They vary with the state of the river's bed. As an acquaintance with the one may contribute to a know-

ledge of the other, I shall apportion the river into sections corresponding to its capabilities, and afterwards indicate the character of the present method of navigating the stream.

The Delta.—As high as the influence of the tide extends, there will always be an ample depth of water for even vessels of a greater draft than those elsewhere described as the best and only boats suited to the river under all circumstances.

It reaches to Nooroo-kanand, a village on the left bank of the river below Tatta. But above this navigation is intricate, nor does it materially improve till beyond the *Delta*.

This is owing to the great expansion of the river's bed, where among the numerous channels that present themselves, it is not always an easy matter to select the right one. No great inconvenience is felt on this score by the vessels now upon the river, for whether they ascend it laden, or in ballast, dragged by the track rope, or propelled by the breeze, their progress is so slow that they may be said to feel every inch of the way.*

From the Delta to Shewan.—This is the best portion of the river, and the *Pulla* fisherman as he floats down the centre of the stream, proclaims the fact. The pole to the lower extremity of which his net is fastened, measures from sixteen to twenty-two feet, and according as this may be in March or August, either eight or fifteen feet of its entire length is immersed in water. Two rocky ledges occur in this section; both project from the right bank of this river, and are found, one under the village of Jeskh, and the other at the north end of the Hilaya reach. Both are under water in the swell.

Shewan to Roree, or Bukkur.—As the character of the last section was determined by the avocations of the fisherman, so may be that of this one. The fishing pole is no longer in general use; but among the shallows in the middle of the stream, men armed with creels, shaped like inverted cones, may be seen busy at work ensnaring the *pulla* fish. Here then it may be presumed, the depths are too irregular for the employment of the former method. Such is the cause, and thus does the practice of the fisheries on this river become an index to the state of its navigation.

Bukkur to Mittun.—A great change here takes place in the character of the river. The stream at Roree, though at some places it may

* See Appendix, Table V. for the soundings of this and other sectional divisions.

be found in a single bed, is more often divided into two or more parallel branches, from 400 yards to four miles apart. Where the former is the case, (at Mittun-kote and for some distance below it, for example,) the channels are more mazy and intricate than where its volume, as in the latter instance, is apportioned among a number of branches. These changes in the configuration of the river are met by a corresponding alteration in the build of the boats. A new description of vessel, called a *tohruk*, of a less draft than the *doondah*, is now the common cargo boat. Where the other is retained, its size is reduced. *Doondahs*, it will be afterwards shewn, requiring five feet and half an inch to float them, are in use upon the river below Bukkur; but above that fort, I have not met a single boat of a draft exceeding three feet nine inches.

Mittun to Kalabagh.—The Indus in this section, as high as Dera Ismail Khan, is equally well suited to navigation, though not better than that last described. It also in some degree resembles that section in its parallel branches and broad bed. Between Dera Ismail Khan and Kalabagh, the difficulties of the navigation increase.

Kalabagh to Attock.—The downward voyage may be made throughout the year; but from April to October the passage is hazardous, and rarely attempted. Boats at all seasons may ascend as high as Sharkee, a village on the right bank of the river, a few miles above Mukkud, but between that and Attock the upward navigation is restricted to the winter months, and even then a boat must have a double crew, and be of a build that does not obtain below Kalabagh, called a *dug-gah*. For a description of this vessel see the 7th article in this Report.

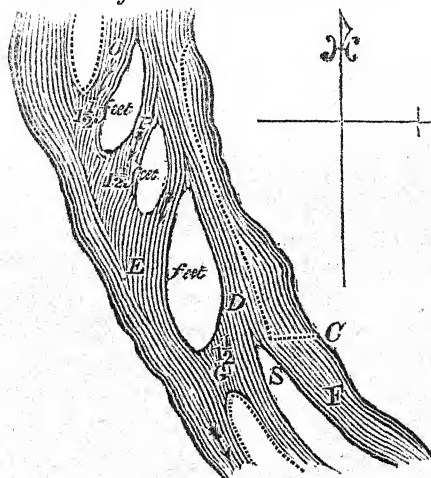
III.—Of the Soundings in Indian Rivers.

After having sketched the greatest capabilities of the Indus from the draft of its boats, it will not be necessary to enlarge in this place on the nature of its soundings. South of Mittun-kote I have inserted, under sectioned heads, specimens enough to shew the characters of the Channels,* referred to. A table marked maximum, minimum, &c. is quite the thing for a thermometrical register; but such a formula for soundings, when applied to an Indian river, mars its own object,

* See Appendix, Table V.

unless indeed it be based on the accumulated experience of years. That I do not therefore crowd these pages with figures, is from a firm conviction of their inutility. They are in fact positively injurious; for when a practical man at a distance casts his eyes over the contents of a table, purporting to give the soundings in a river's channel, and finds the least depth to be two fathoms, he very naturally concludes that a boat constructed to draw only nine feet, will navigate the said river. No conclusion could be more erroneous, the reasoning is suited to the equable streams of the new world; but not applicable to the ever-changing channels of our Indian rivers. To what other causes can we attribute that crude digest of a prospectus for introducing steam upon the Indus for commercial purposes, that lately reached this country from England, authenticated by names of the first rank and respectability in the mercantile world? One of the articles in the proposed Joint Stock Company provided for stationing a ship of one thousand tons, (an old East Indiaman,) as a depôt inside the river. Such a vessel could hardly come in sight of the Sindian coast. Lieutenant Charles' survey of the mouths of the river has made us acquainted with their actual condition, and in another part of this report, what should be the draft of the Indus Steamers;* and this decision is the result of a most careful examination of the river, both in its dry season and during its freshes.

Sketch of a Reach below Sehewan.



* See the 8th Article in this Report.

there is seldom more than three-quarters of a fathom water on the spot separating the channels. Whether alterations in the channels of other large rivers are brought about in a similar manner, I am not aware ; but this peculiarity, if it can be so termed, is familiar to the boatmen on the Indus ; and with a description of the manner of their meeting it, and of the precautionary measures to which it gives rise, I shall conclude this notice of its navigation.

No vessel with cargo on board makes a downward voyage unaided by a pilot boat ; it is called here *sooe*, or guide. These are small cheap skiffs managed by a couple of men, one of whom standing on a platform in the bows gives the depth of water, while the other, with his scull over the stern, steers the boat. Cheap as the services of a pilot may be had, the protracted length of the voyage makes it a burden too weighty for a single cargo to bear, and the custom therefore is, for boats to drop down the river in fleets, or by divisions, when *sooes* become so multiplied, that to every two or three large boats a tender is attached. Grain being the only freight, all shipments are made at a stated season of the year ; and as the quantity of corn produced on the banks of the Indus in autumn far exceeds that cut down in spring, the winter fleet outnumbered in an equal proportion that which takes its departure about midsummer. In February 1837, when the river was at its lowest level, I counted forty-two grain laden boats pass Sehewan on their way to Hyderabad, whither the surplus of the Upper Provinces is yearly exported.

The largest of these boats drew five feet and half an inch of water, and the manner of conducting the fleet was as follows:—When the day's stage has been fixed, a detachment of *sooe* went ahead to sound, into each boat there being, besides her own small complement, two or more of the *doondah's* men. On their arrival all is bustle and noise in the fleet. The fastenings of the boats are cast off, the oars are plied, and the huge hulk, preceded by her guide, shears out into the stream.

If the *meerbars* have confidence in the channels, and the wind be fair, a large square sail is set, and the unwieldy *doondah*, deep though she be, outstrips her tender, and seems to skim the surface of the water ; —such a fleet in motion is worth seeing. First, the large white sail of the headmost boat is discovered at the top of the reach, then another,

and another, until the surface of the river becomes studded with those uncouth, yet really interesting objects. As may be supposed, this mode of navigation is tedious, the daily stages not averaging more than from ten to twenty miles. Delays too are not unfrequent in the dry season; but never exceed fifteen days, and rarely extend to half that number.

When there is a prospect of a long detention, it is customary for large boats to transfer a portion of their cargo into smaller ones, and take it on board again when the shoal water is past. In high wind, the boats remain fast by the bank of the river. The two following Tables are inserted in illustration of the above remarks:—

Tables, shewing the cargo draft of the largest boats upon the Indus, with the least water in the continuous channel, during the dry season of 1837.

Draft of Boats.

Channel.

Class of Boats.	Cubic Draft.		Gunwale above water line.	Places.	Depth.	
	Ft.	In.			Ft.	In.
1st Class,	5	0 $\frac{1}{2}$	10 Inches.	Gooloo,	3	8
2nd ditto, ..	4	9	9 ditto.	Lillong, ..	4	4
3rd ditto,	4	3	9 ditto.	Mycotta, ..	4	8
4th ditto,	3	3	7 ditto.	Bulalpoor, .	4	1
5th ditto,	3	0	5 $\frac{1}{2}$ ditto.	Kaira,	4	8

The places in the above Table are all situated between Sehewan and Roree; but they furnish a good example of the depth in other places.

Boats descending in the freshes, proceed as above described. In this season the length of the voyage is much shortened, though attended with considerably more risk. A pilot is still required; but a previous examination of the channel is not always considered necessary.

The following Table gives a statement of the downward voyage at opposite seasons of the year. It embraces the whole navigable extent of the river, and includes Pilotage where such a custom prevails. The voyages are such as are rarely performed even by Sindie boats, even when the river is clear, and other circumstances favourable.

The Downward Voyage.

Stages.	Dry Season.	Freshes.	Pilotage.
Attock to Kalabagh,	1½ Days	1 Days	—
Kalabagh to Dera Ismail Khan,	7 ditto.	2 do.	6 Rupees
Dera Ismail Khan to Dera Ghazee Khan,	10 ditto.	3½ do.	6 do.
Dera Ghazee Khan to Mittun,	4 ditto.	2 do.	3 do.
Mittun to Roree,	6 ditto.	3½ do.	a boat 18 Rs.
Roree to Sehewan,	7 ditto.	4 do.	do. 16 do.
Sehewan to Hyderabad, ..	3 ditto.	2 do.	do. 12 do.
Hyderabad to Sea,	2½ ditto.	2 do.	do. 12 do.
Total	41 Days.	20 Days.	

The upward voyage is performed by the aid of the wind and track rope. This last mode of procedure is slow, but certain; and averages about eight koss, or thirteen miles, a day. With a strong favourable breeze, the daily progress is increased to twelve and eighteen koss. The prevailing winds during the year, and their consequent influence on the navigation of the river, are given under the next head, and it will there be seen that the freshes, far from presenting any obstacle to the upward voyage, are more favourable to it than otherwise. During their continuance, a south wind blows from the sea to Kalabagh; and though less steady on the Upper Indus than in the lower part of the river, it is a great service to navigation, since the time consumed by an up-river voyage, in the dry season, may be stated as one-half in excess of that required to perform it in the swell. Annexed is a Table, shewing the relative time occupied by the voyage at opposite seasons of the year:—

The Upward Voyage.

Stages.	Dry Season.	Freshes.
Seaport to Hyderabad,	15 Days.	7 Days.
Hyderabad to Sehewan,	8 ditto.	4 ditto.
Sehewan to Roree,	14 ditto.	7 ditto.
Roree to Mittun,	14 ditto.	6½ ditto.
Mittun to Dera Ghazee Khan, ..	10 ditto.	4 ditto.
Dera Ghazee Khan to Dera Ismail Khan,	11 ditto.	10 ditto.
Dera Ismail Khan to Kalabagh, ..	12 ditto.	7 ditto.
Kalabagh to Attock,	15 ditto.	Impracticable.
Total, ..	107 Days.	45½ Days.

Of the foregoing Tables it may be remarked, that under a different management, the number of days occupied in performing the voyages, especially up-river in the dry season, will be much reduced. At present, *time* is no object to the Sindian; and besides, he loads his boats so deep, that the ripple caused by only a moderate breeze, endangers her safety.

V.—Of the Winds and Weather in the Valley of the Indus.

The prevailing winds of the Indus conform to the direction of the river, blowing for six months up the stream, and as many down it. From April to September the breeze is southerly, and during the other months of the year it comes from the north. An east wind of twelve hours' continuance is rarely felt. When a change in the prevailing direction takes place, the wind veers by the west from 10 P. M. till noon of the following day; the wind is usually fresh. The evening and afternoon too often oppressive, for want of the usual breeze. This last remark is, however, more especially applicable to the weather on the Upper Indus.

In Lower Sindh it is often just the reverse, the breeze there freshening up about 3 P. M. However warm the day may have been, the nights, with few exceptions, are cool. A more particular account of the prevailing winds will be found in the annexed Table:—

Prevailing Winds.

Months.	North.	South.	Calm and Variable.
January,	29	2	0
February,	22	6	0
March,	17	13	0
April,	7	15	8
May,	1	29	1
June,	0	28	2
July,	0	28	3
August,	6	27	4
September,	0	24	0
October,			
November,			
December,			

The south wind.—It reaches Kalabagh at the entrance of the mountains, and last year was as fresh and steady upon the Upper as on the Lower Indus. This wind is believed by the boatmen of the latter to cease at Sehewan, and in my report on the inundation in 1836 I mentioned the circumstance. Such, however, is not exactly the case. South of Sehewan a spur from the Hala mountains comes down upon the Indus, which intercepts the breeze, and turns it off from the river, so that above the town for many miles calms and sultry weather are characteristic of a season remarkable at other places for the steadiness of the prevailing wind; yet though this peculiarity is thus shown to be local, another circumstance leads me to think, (contrary to my own experience,) that the south wind is less fresh upon the Upper Indus than lower down the river. Above Roree the boats have but a single reef band in their sails, while at Hyderabad it is no uncommon thing to see them scudding before the breeze with their sails double and even triple reefed.

The north wind is not so steady as the south, but is oftener more violent while it lasts; clouds of sand darken the air, and compel the trackers to bring their boat to the bank. This wind is cold in November, December, January, and February; the thermometer at sunrise is often but a few degrees above the freezing point. During the season that northerly winds prevail, gales from the south are not infrequent. These are always scarce, and usually, last three days. The change is marked by cloudy, rainy weather, lightning, and thunder.

Variable Winds.—During those sultry breezes that follow the daily lulling of the prevailing wind, the calm is often agreeably broken by light breezes off the river.

These are seldom sufficiently strong or lasting to benefit navigation, but in tempering the heat of the atmosphere, and conducing to the health of the numerous tribes that dwell on the banks of this river, they serve an important purpose.

Storms.—Plenty of warning is always given, and ample time afforded to secure the boat, which should be done either under the weather bank of the river, or the lee side of an island or sand bank. An unsheltered position in deep water, with the open river to windward, generally settles the fate of an Indus boat. If loaded, she

at once fills and goes down, and if empty, the shaking produced by a short chopping sea soon opens the seams of a vessel that has no beams to hold her frame together.

In a river danger from this cause may appear slight; but when the stream and wind are opposed to each other, a short breaking sea is formed, that will swamp a six-oared cutter at a grappling. Most of the boats that are lost on the Indus, are wrecked in the manner here described. Gales of wind are experienced throughout the whole line of the Indus. They are more frequent near the mountains, than in the neighbourhood of the sea.

VI.—Of the Boats upon the Indus.

The boats upon the Indus are of simple construction, and their figure is perhaps the best that could be given, considering the kind of navigation in which they are employed. They are easily constructed, not very expensive, and for stowage of cargo, no form could be better devised. Their proportions though not elegant, are pleasing, and tracking or under sail, their appearance is pretty.

The employment of the Indus craft is confined to harvesting the crop, serving the ferries, and keeping large towns in fuel. For these purposes, the supply is ample. Second, between the sea and Attock two kinds of vessels are in use, the *zohruk* on the Upper, and the *doondah* upon the Lower Indus. In boats belonging to the latter class, a slight difference in the build gives rise to a further classification, and of this description of vessel the *moohanah*, (boatman,) enumerates more than one variety. But before particularizing each, a description of the *doondah* is necessary. Her good and bad qualities are shared alike by them all, and the following notice of this boat is therefore applicable to every vessel on the river:—

Form and method of construction.—The hull or body of the boat is formed by the junction of three detached pieces, namely, two sides and a bottom—at variance with our ideas of naval architecture; the three parts are first separately completed, and then brought together as a cabinet-maker does the side of a box. The junction is thus effected: when each of the three parts that are to form the whole is completed in itself, the sides are carried to the bottom of the boat, and at

once secured by crooked pieces of timber to the flat future bottom of the *doondah*. To bring the bow and stern up to the corresponding parts of the side is more difficult; and to effect this, many days are necessary. Where the bow and the stern are to rise, the planks are lubricated with a certain composition, which gives them a tendency to curve upwards, and this is further increased by the application of force. The extremes thus risen, a tackle is stretched between them, and by constant application of the heating mixture, and a daily pull upon the purchase, they rise to the required angle, and are secured to the side, while an advantageous curve is imparted by this process to the plank in the boat's bottom. The bow of the *doondah* is a broad inclined plane, making an angle of about 20° with the surface of the water. The stern is of the same figure, but subtends double the angle.

Advantages of this construction.—To the slight curve in her bottom planks she is indebted for the following advantages:—In descending a river, should she strike upon a sand bank the boat turns like a top, and presents no stationary point for the stream to act against. A merely flat-bottomed vessel would probably shew her broadside, and the stronger the current was running, the greater would be the difficulty in getting such a boat again into deep water. Thus in a situation where the *doondah* experiences but a little inconvenience, and occasionally it may be a few hours' detention, a boat of another and but a slightly altered form would be very awkwardly placed, though her safety might not be actually endangered. In passing through eddies, the common or wedged-shaped bow dips considerably, while the form of the *doondah's* prow has a tendency to lighten her draft, and the more rapid the current or the greater her velocity, the more buoyant she floats. When forced out or against the river's banks—an accident which the defective steerage of the *doondah* renders of frequent occurrence in tracking—the form of her bow, where the bank is not too high, parries the violence of the shock. A greater defect in the common wedged-shaped bow for river navigation, (at least in those of the Indus, where the current is very irregular,) is the surface it presents for currents or cross-currents to act against; these force the boat from its course, and deprive the helm of its power. In tracking this is often seen; and I can remember rather a ludicrous instance which occurred to the *Indus Steamer*,

whilst coming up the river to Hyderabad in 1836. The day to which I allude, it was necessary to second the power of the engine by a tracking party on shore, and a number of Hindoo countrymen were employed for the purpose. All went on well, till the bow of the boat got inclined to the direction of the current, when out she shot like an arrow into the stream, and with her dragged the trackers.

Casting off the drag rope prevented accident; but the situation in which it left the Hindoos, was not a little grotesque. Between the firm ground and the river lay a strip of recently placed alluvium, and in this the Sindees were planted at various depths, from the middle downwards.

The present great defect in the form of the *doondah* is bad steerage. By rounding her quarter, and making other judicious alterations, this could be improved. To fit them for conveying merchandize, they require to be stronger built; and for the convenience of the merchant, to have better accommodation; in fact to be restored to the state in which an early traveller, Captain Hamilton, described them when trade flourished by the Indus, and its arrangements were such as to attract the notice of an intelligent European.

Rig of the Boats.—The masts are poised upon strong beams resting athwart the gunwales. Moving on this *fulcrum* their management is easy, and the masts can be lowered down or placed upright at pleasure.

The sail is hoisted behind in preference to before the mast for several reasons, the principal of which is, that as the boat sails only with a favourable wind, it is never necessary to brace or haul up the yard, and fewer hands suffice to manage the boat.

The *jumptee* is the state barge of the Sinde Ameers, and is used by them and their principal officers on all occasions, whether of business or pleasure. Perhaps the appearance of this boat, as she approaches the capital, is more characteristic of the Indus and of Sinde, than aught else to be seen in the country. On this day her *meerbar* puts on clean clothes, and the national cap received from the Ameers on a recent river excursion. The bright hues of the cap, formed by the gaudiest coloured chintz, vie with those of a Kilmarnock bonnet, or a Paisley tartan. The crew are dressed becoming the occasion, and as they bend to the track rope, the breeze


distends their ample robes, and a further character of stateliness is imparted to the *jumptee*. Large red flags were over her stern, and from the raking mast streams a long party-colored pendant that anon skims the water, as the breeze lulls and freshens. In the bow of the boat is a small crimson pavillion, in which royalty reclines, and in the other extreme of the vessel, a roomy cabin of elaborately carved work, for its numerous attendants.

The steersman on an elevated platform, stands in bold relief, and while he guides the boat, encourages the trackers. The *jumptee's* crew are a noisy set; but for aged men, wonderfully good humoured. They are divided into two gangs or watches, and are as partial to a cup of good *bang*, as sailors are to grog. These boats are decked, and of considerable tonnage. One which I saw at Hyderabad, measured one hundred and twenty feet over all, with a beam of $18\frac{1}{2}$ feet; her draft of water was two feet six inches, she pulled six* oars, and had a crew of thirty men. They are built of Malabar teak, chiefly at the ports of Mughribee and Curatchee. *Jumptees* are seldom lost; the only danger to which they are liable is that of having their bottom pierced by sunken trees. Their more substantial build keeps the frame of the boat together in situations where the poor-pieced shell of a *doondah* would fall asunder. The *doondah* is the cargo boat of Sinde; her principal and almost her sole employment being, the transport of grain.

The Cowtell.—This again is the ferry boat of Sinde; her construction adapts her for this service, and for conveying houses up and down the river. From her great beam and high draft of water, she is a faster boat than the *doondah*. In all their excursions on the river, the Ameers are accompanied by many boats of this description. The class is not numerous, and most of the boats are the property of government.

The *doondee* is common from the sea to Mittun, and the boat most generally used in the fisheries, both upon the river and its *dunds*, (small lakes). It is the smallest description of vessel upon the Indus, and at the same time one of the most useful. Two men are ample to its management; but a man and wife are its usual crew.

The Zohruk.—What the *doondah* is in Sinde, the *zohruk* is upon the Upper Indus, namely, the common cargo boat of the country. The

* So in MS. ? 16 oars? 

planks of this vessel are held together by clamps instead of nails, and the junction is often neatly enough executed. This class of boats is not so strong as the *doondah*, but they sail faster and draw less water. They are more roomy than the *doondah*, and though less adapted for the conveyance of goods, are much superior for transporting troops.

The Duggah.—This is the clumsiest, and at the same time, the strongest built boat upon the Indus. She is confined to that rocky and dangerous part of the coast, between Kalabagh and Attock. The form of the boat differs but slightly from that of the *doondah*. The *duggah* has neither mast nor sail. Her name is the Sindean word for cow, and the awkward sluggish motion of this boat shews that it has not been misapplied. If the *duggah* drops down the river to Mittun, there she must remain, and be sold for whatever sum she will bring; for to drag her up against the stream to Kalabagh, would cost more money in the hire of men, than the boat is worth.

Management of the Boats.—Under sail the very best of them will not be within eight or nine points of the wind. Dropping down the river with a contrary wind, the mast is unshipped, as also the rudder, and the latter is replaced by two sculls. Should the wind blow strong, a boat without cargo can make no progress, and the safety of one laden, is endangered by the chopping sea it raises.

Tracking is performed as follows:—the boat is provided with a track rope at least a hundred fathoms long; it is rove through the uppermost sheave-hole at the mast head, and the inner end fastened to the rail or platform on which the steersman is standing. On the hauling post before the mast, is a guy, called a "*lagh*," the lower end of which passes through a ring bolt in the bow of the boat. This guy is of as much utility as the helm itself. Before the boat starts the track rope is middled, and the inner half coiled down under the feet of the steersman: one man is stationed by the guy, and the remainder of the crew toggle on to the shore part of the line. Thus yoked they march at the rate of two miles an hour up to the knees, often higher, in water or in mud. Whilst thus advancing the foremost walker calls out "*shoal water*," on which the inner end of the clog rope is let go, the guy eased off, the helm put to one side or the other, as the case may be, and the boat thus relieved, avoids taking the ground by shooting out into the stream. The shoal passed, the guy

is shortened, the line again middled, and the crew advance at the same slow pace as before. Boats should have two track ropes, and when turning the bends of the reaches, both should be on shore. They should also be provided with a heavy grapnel to drop, in the event of accident to the track ropes.

The steep banks in bends of the river should be avoided, for under it circles a current in a contrary direction to that of the main stream, the quick gyratory motion of which is constantly exerted to the destruction of the bank, and that of such boats as frequent it.*

Boat Building, Materials, Suggestions.—Boats are constructed according to established usage, which has fixed a proportion between the beam and length of each boat. The tonnage is calculated on the boat's bottom, from the point where the stem and stern rise. The angle at which it takes place is matter of taste, a high projecting stern improves the steerage, and a low bow gives speed. The banks of the *Indus* are deficient in almost every article used in constructing the boats on the river. The Lower *Sinde* is supplied with plank and spars from the Malabar coast, and with coir and cordage from the same quarter. The Ameers of Hyderabad, are, however, the chief, almost the sole purchasers. The *Moolhana*, unable to give the high price asked by Cutch boatmen for teak plank, exhibit both skill and ingenuity in building boats of timber of their own country's growth; for this the orchard is robbed, and the country for miles round laid under contribution. In the bottom of a single boat, teak, baire, fir, babool, and the curreet tree are sometimes seen together, and in the same extent of workmanship, six hundred and seventy three patches have been counted.

The Upper *Indus* is principally supplied from the banks of the Chenaub, where the talee tree, the sissoo of Hindostan, is seen with a trunk measuring twelve feet in circumference. Three such trees furnish plank enough to build a large sized *zohruk*.

The Attock boats are built of good fir, brought down the Cabool river, and from the forest of the Lower Himalaya.

Iron Work.—The Lower *Indus* is supplied from Bombay, and the upper portion of the river from the mines of Bunnoo and Badjour.

* See an example of this in Table VI. of the Appendix, headed Irregularities in the bed of the *Indus*.

It is customary to purchase the latter in the matrix, and to allow a per centage to the blacksmith who smelts the ore, and works it up into nails.

Cordage.—Upon the Upper Indus the rope is either of hemp, or formed from the culm of certain tall reedy grasses, very plentiful on the banks of this river.

The tools of the Sinde carpenter are as little diversified in form as those used by the same class of artificers in India. The absence of good material to work upon sharpens his inventive powers, and gives a manual dexterity that improves the execution of whatever he may have to do, when really good timber comes before him. If a curve is to be imparted to one or a dozen planks united, chaff moistened with water is the Sinde carpenter's store; or what answers the purpose still better, the dung of animals, and more especially that of sheep.

Teak-built boats are much prized by the *Moohana*, as are those of cedar and fir construction, which come from Pind Dadun Khan, on the Jalum. Such boats, when well put together, will run forty years; but from seven to ten is the duration of those patched up with the jungle wood of the country; and if care has not been used to see that the wood employed in her construction was originally well seasoned and selected, a less number of years brings on the decrepitude of age, when to delay a thorough repair, is to lose the boat.

Adaption of the Indus Boats, for the transport of military stores.—They are not calculated to bear the weight of ordnance, such as a battering train; and at the present moment there is not a boat upon the river, which a Committee would declare efficient for the transport of these heavy guns. For this purpose, the boat should have a perfectly flat bottom, that the weight of metal may be equally distributed over the immersed portion of the hull. The sides too require to be fixed to the bottom in a more secure manner than is at present customary. The knees which connect them should be formed of iron, in preference to wood. If shot is to be carried, the bottom of the boat should be planked over the beams, as well as under them. The latter is all that is done at present; but if this is not guarded against, the nails will draw, and the shot fall through.

Should it become desirable to increase the amount of tonnage upon the *Indus*, boats could be built at Bombay, Hyderabad in Sinde, or

Pind Dadun Khan in the Punjab. If at the former place, it would be desirable there only to prepare the frame; but to build the boat, that is, to put her together in the river, good artificers are to be had in the country; but the introduction of a few superior workmen from the dockyard, with a clever native foreman or overseer would be necessary. A smith is an indispensable accompaniment, and when steamers are introduced, this establishment should, to be efficient, be possessed of science, material, and skill. If Hyderabad were to be selected for building boats, still all the material must come from Bombay. If Pind Dadun Khan had the preference, a small supply of cedar plank might be there calculated upon, and the services of better workmen than are to be procured in Sindé.

Boat Hire.—In this charge there is some incongruity; yet it does not appear to exceed the rate of hire that prevails upon the Ganges.*

VII.—Of Steam Vessels for the Indus.

Naturally solicitous to be acquainted with the present state of internal steam navigation upon the Ganges, on presenting Government with the result of my experience on this river, I addressed a letter, forwarding a list of queries on the subject, to Mr. C. B. Greenlaw of Calcutta, and through the kindness of that gentleman, I have been favoured with the accompanying valuable report from the pen of Captain Johnston, controller of Government steam vessels,—an officer more conversant with these matters than any man in India. In submitting this document to his Lordship the Governor General in Council, I will only remark, that in every essential point the class of vessels described by Captain Johnston, seems well suited to the Indus, and the economy that pervades the steam establishment upon the Ganges, is worthy of imitation here.

Towards the close of the year 1835, when the *Indus* steamer arrived off Hyderabad, one of the Sindé Ameers expressed a wish to be possessed of a similar, but a more powerful vessel. Captain Burnes, who was then at that court, requested my opinion on the description of vessel best suited

* See Appendix, Tables IV, VII, VIII, for the tonnage, price, and hire of Indus boats.

for the Indus, and from the reply to his communication, the following paragraph is an extract, from which it will be observed, that I had then fixed for the draft of an Indus steamer, the exact number of inches, which boats upon the Ganges draw.

Paragraph 11th.—"In a preceding paragraph, I stated that powerful vessels were required on the Indus; the reason is this: In some parts of the stream, the current has a velocity of five and six knots an hour.* It will, therefore, be wise to possess a sufficient power, since steam is now so under controul, that in the downward voyage, where accidents are more liable to occur, it can be reduced at pleasure; but if the engines be originally too weak, a new boat is a costly remedy. Two feet six inches is a good draft of water, and ought not to be exceeded, the boat to have great beam, not much length, and no keel."

Remarks on the Steam Boats of the Ganges, furnished by their Controller, Lieut. Johnston, R. N.

"Four iron steam boats are now employed in inland communication; each steam boat is 125 feet long over all, 22 feet broad, and tows an accommodation boat of the same length, and 20 feet broad, with a hold of five feet deep, capable of towing 4000 feet of cargo, weighing 40 tons, the boat's draft when so loaded, not exceeding 30 inches. The iron sides of the boat are 5 feet deep, above that is a light superstruc-tion of wood in the accommodation boat; between the deck, which forms the hold and the deck on which the crew and passengers walk, the height is nearly 7 feet, and the included space from one end of the vessel to within 20 of the other, or fore end, is divided into cabins and dining rooms, &c. Fourteen cabins are available to passengers; four of 12 feet by 9; four of 9 by $8\frac{1}{2}$; and six of $8\frac{1}{2}$ by $6\frac{1}{4}$; a dining room 20 by 12; two bathing rooms; two pantry or store-rooms, a butler's room; guard room, and two cabins for officers. Each cabin has a water closet; the windows or venetians are 4 feet deep by $2\frac{1}{2}$ wide. In the steam boat, the iron side is continued up in the centre to the height of the beams, which carry the paddle shafts, and the light paddle boxes

* I had not, when this was written, seen the Indus during its freshes.

are of wood. The engines are double, of 60 horse power, oscillating; they consume of Burdwan coal about 10 pounds per horse power per hour, and carry at a draft of 30 inches, about 450 maunds. In the steamer there is a large cabin abaft the boiler, not habitable by Europeans in the warm weather; but very comfortable in the cold. Before the engines, there are two cabins on each side, 8 feet by 5, with a space between that forms a mess room. There is also a very light cabin on the deck of $\frac{3}{4}$ inch board 8 feet by 10; the engines are before the boiler; the steamers have one mast and top-mast, on which they set square sails when the wind is fair. The boat, (a good stout cutter,) is always towed close up to the stern of the accommodation boat. The anchors are 4 and 5 cwt., besides stream and kedge anchors, grapnels, &c. They are well furnished with ground tackle; chain cables are alone used. The diameter of the paddle wheel is 16 feet, the breadth 6, the board 6 feet long, 8 inches deep, and 18 on each wheel: they are preferred of fir, and are 2 inches thick. The centre board, when the vessel has her coal on board, is 3 inches below the water surface. The greatest speed of the steamer when alone, is 9 statute miles an hour; with the accommodation boat in tow, 7 miles.

“The contractors have their coal in depôts on shore, and send it in boats to the steamers when they cannot lay along-side the bank. Coal is taken by weight, and one hour allowed for the delivery of one hundred maunds.

“In the bow of the accommodation boat and in the stern of the steamer, are fixed strong posts well secured, and at the same height a saddle is bolted on each, and protected by an iron plate. An iron hoop 6 inches deep is on the post also above the saddle, in contact with it; a beam of 18 feet long, 14 inches broad, and 5 inches thick, with jaws at each end, connects the boats by resting with its two ends on the saddles, and is secured round the posts with a chain with a hook and lever, so as by letting go the end of the lever, to detach the chain in an instant, and allow the boats to separate. There are also hawsers from each bow of the accommodation boat to the paddle boxes of the steamer, which serve to guide the boats, and assist the steering; the following boat acting as a powerful rudder to the preceding one.

"Progress is more easy and safe up the Ganges during the dry season. There is little danger at any time in ascending the streams, but much in coming down; most during the dry season, when the channels are all defined, and the commanders are instructed to come with great caution, dropping through the difficult reaches with the head of the boats up the stream. They are instructed to consider the preservation of the boats the first consideration; speed a secondary one. In the dry season, the voyage downwards frequently occupies sixteen or seventeen days; in the swell five, six, seven, and ten; the upward voyage during the greatest strength of the current occupies from twenty-five to thirty days; at other times nineteen to twenty-three, and twenty-five in the swell. The current of the Ganges is seven miles in the dry season.

"The boats in the swell can generally evade the strength of the current by running over, or on the edge of sands; in the dry season they must generally encounter it in full force.

"There is an establishment of Pilots, (native fishermen.) The distances vary from eighteen to twenty-six miles, through which they are required to be acquainted with the channels; nevertheless, a boat seldom makes a voyage without grounding, and the principal injury the boats sustain, is coming in contact; under these circumstances, it is nearly confined to the superstructure. On one occasion only a pair of boats suffered under water, being thrown against rocks by a strong eddy when descending under steam; each boat had a hole forced through the bottom; they were easily stopped, the injury being confined to the portion of metal actually in contact with the rock. A wooden boat would have been shattered by the concussion.

"It would not be possible to construct wooden boats to retain their form as the light draft the iron boats do; and I can conceive no means of improving on the boats we have, limited, as by the nature of the rivers we are, to length and draft of water. I believe, that for the Ganges above Allahabad it will be in my power to fix a steam boat not to draw more than 22 inches, with 24 hours' fuel, the economy of weight will be confined to the superstructure, the iron hull being the same in point of form and dimensions as those now plying, the metal a little higher."

(Signed) JAMES H. JOHNSTON.

There is one point in the above report, where I conceive a different arrangement must be made upon the Indus to what prevails on the Ganges. Most of the fuel *depôts* on the Indus must be afloat. If wood firing is used, there is no alternative, for otherwise the time lost taking it on board will cancel all the other advantages of steam.

The banks of the Ganges are high, substantial, and compared to the banks of this river—permanent. Towns overlook the river ghauts, or landing places are constructed on the banks, and the steam boat at most of the stations has only to shore alongside the ghaut and receive her fuel.

It is very different with the Indus. Towns stand within two miles of the river, and the banks are ever varying their outline. I would therefore recommend that large manageable flats be used for this purpose, and anchored at such distances apart as subsequent experience may suggest; their draft should be restricted to 3 feet 6 inches, and each should have a small boat attached, by which means the crew of the flat would be able to keep the floating well supplied from the shore store.

I am further of opinion, that were the *zohawk's* defective steerage overcome, steamers built upon her model will prove efficient boats.

VIII.—Of Fuel for Steam Boats.

The jungle on the banks of the Indus contains the following trees:—

1. *Mangrove*.—Found in the Delta, is plentiful, and burns well. Though it attains no great height, it has sometimes a circumference of 12 feet.

2. *Kundie*.—Rarely exceeds 9 feet in height, and is found, though not confined to the locality under the Lukkee mountains, between Chandkote and Sehewan. In Lower Sind, this wood is scarce; but twelve miles south of Mittun, on the west bank of the river, is an extensive jungle, in which this is the most common tree; the hardness of its fibre and the crookedness of its grain, make it in great request among the boat-builders.

3. *Bawn*.—Little of this wood is seen below Hyderabad; but between that capital and Sehewan the tree is common. As a fuel, it is useless.

4. *Jall* or *Pello*.—This tree is found in every part of the river's course. Between the river and Desert, two descriptions of trees prevail. Tama-

risk fringes the river, Jall or Pelloo the desert; the latter as a fuel is not superior to Baun.

5. *Tamarisk*.—From the sea to Kalabagh, this wood is more or less plentiful; almost any quantity of it is procurable; but the large wood is distant from one to twelve miles from the Indus, and considerable expence and delay must necessarily be incurred in transporting it to the river. *Tamarisk* is the common firewood of this country.

6. *Kurreel*.—It is plentiful in Sinde; but makes an indifferent fuel; it gives out volumes of smoke, but emits no flame. This wood is generally crooked, and its fibre being hard, it is advantageously used for knees of boats, and wherever curved lines, strength, and durability are sought to be combined.

7. *Loohera*.—Between lake Munchur and the mountains, grows a tree of this name, of a dwarfish size, and very common; as a fuel it is even worse than the last described.

8. *Tallee*.—This tree is not common on the banks of the Indus, and the few that do occur, are found near villages, in single trees. It attains a large size, and is much in request amongst the boat-builders. It burns well; but the tree is too valuable to be cut down solely for firewood.

9. *Babool* or *Bubber*.—This tree is plentiful in Sinde; but becomes less as we ascend the river. It makes an excellent fuel.

Shikargahs or *Hunting Forests*.—They are numerous below Sehe-wan; but above that town, they are not found. The trees they contain are mostly *Tamarisk* and *Babool*. These forests at some places fringe the river for three and four miles; but their medium width seldom exceeds one. In a few of them are trees of a large size; but far the greater number are merely extensive thickets, containing saplings of sorts, tall grass, and reeds, the spontaneous offspring of a rank inundated soil.

In December 1835, I made several experiments with the *Indus* steamer to ascertain the relative strength of wood and coal fuel. The result was as follows:—*Tamarisk*, when newly cut down, would not generate enough steam to keep the engine, though working only one-half power. If the billets were large and thoroughly dry, it answered the purpose better; though I consider this wood at best but a very indifferent fuel. *Mangrove* and the *Babool* trees are much superior; burning equal proportions of the two last, the furnaces were reple-

nished once in seven minutes : with coal, (not however of a very good quality,) every fifteen. Coal has thus an advantage over wood fuel in something more than the proportion of two to one, and when the superior performance of machinery driven by the former is taken into account, it is doubtful which is the more economical plan to navigate the Indus, with coal from England, or the jungle now growing upon its banks.* The question resolves itself simply into one of expence, for there is wood enough on the banks of the Indus, to keep two or more steamers constantly plying for years to come.

On this subject, Captain Johnston, the Controller of Government Steam Vessels, has made several experiments with steam boats on the Ganges. The result is already before Government ; but having obtained, through the kindness of that officer, a copy of his report, the nature and value of its contents is my apology for introducing it here.

*Report on the relative value of Wood and Coal, by Captain Johnston,
the Controller of Government Steam Vessels.*

On Friday the 27th instant, I ordered the steam to be got up on board the *Experiment Flat*, and ran for two hours on the ebb tide between Fort William and the Reach below Budgebudge, and consumed nine and half maunds of coal, making on an average 29 revolutions. I then returned with a flood tide, and in two hours consumed $11\frac{1}{4}$ maunds of wood, making on an average 21 revolutions. I also noted the time we were running the same distances under coal and wood steam ; the periods were 90 minutes with coal, and 112 with wood ; great care and persevering attention were required in the stocking with wood to keep the steam up, and twice the engines were nearly at rest from the steam failing. Admitting that the revolutions of the wheel on the strokes of the piston in the cylinder measure the steam expanded in any given time, the coal would have supplied the cylinder 6960 times.

The wood, 5040

Making a difference of 1920

* Coal has been discovered on both banks of the Indus; the locality is the salt range, in the parallel of 32° North, deposits extending in a longitudinal direction ; but not in a North and South one. Ten specimens from the West bank procured by Captain Burnes have been analyzed by Mr. Prinsep, and four of them pronounced to be the purest form of mineral coal. Those forwarded by me, and discovered on the East bank, have not yet been examined.

measures, which at 42 per minute, would have required $45\frac{1}{2}$ minutes longer of the consumption of wood to have completed, which at the rate of $11\frac{1}{4}$ maunds in 240 minutes, would have required $4\frac{1}{4}$ maunds nearly, which added to $11\frac{1}{4}$ would make $15\frac{1}{2}$ maunds of wood to produce the same quantity of steam as $9\frac{1}{2}$ maunds of coal; but it has been seen, that owing to the weakness of the steam provided by the consumption of wood to perform the same distance, required $\frac{22}{120}$, or one-sixth more time nearly, a detention most injurious to the interest of Internal Steam Navigation.

30th October, 1837.

(Signed) J. H. JOHNSTON, *Controller.*

IX.—Of the Inundation.

Like all other large rivers, the Indus is subject to a periodical increase of its water; during the continuation of which, it inundates a large tract of country. The river rises in March, and falls in September. From Mittun upwards, I have delineated the flooded district upon the chart; but in tracing their boundaries between that district and the sea, I labour under the disadvantage of having to draw my material as much from hearsay as personal observation.

It may in this place be observed, that the valley of the Lower Indus owes its crops entirely to the yearly swell of its river.

The soil of Sind is naturally poor, producing spontaneously the products of the desert; but save within the belt of inundation, neither grain for man or grass for cattle. Even here grass is scanty and coarse; a turf is a thing unknown on the banks of the Indus, and the Islands in the stream below Bukkur are nothing more than naked sand banks. Two consecutive crops exhaust the soil, unless manured. The natives it is true liken it to gold; but the comparison would be more just if applied to the river, the cause of all its fertility. On the banks of the Upper Indus the soil improves, and were such subject not irrelevant to this report, I might proceed to adduce the proof of this assertion, and to investigate the cause of so apparent an anomaly.

In some respects, the annual swelling of the Indus is attended with peculiar phenomena. One year the country on its right bank is so deluged, that towns and villages, though protected by strong dams,

are threatened with inundation; while on the opposite side of the river, there may be found, during the same season, a difficulty of irrigation. In thus distributing its favour, the stream exhibits more of constancy than caprice, for when once it has taken to either of the banks, it adheres for a series of years to the favoured side. Another circumstance merits notice. The Mississippi when in flood, as we learn from Audubon, the talented American ornithologist, inundates the valley to a large extent; at that season the Squatter and a Lumber river canoe pierce the thickest depths of the forest, while flat boats of great burden, and steamers of noble dimensions, are seen moored to stately trees overhanging its banks. The Ganges in the lower part of its course, overflows its banks in a similar manner to the Mississippi. During the S. W., or rainy monsoon, when the former river is in flood, the whole of its Sunderbunds, or Delta lands are, according to Rennel, submerged. With the Indus it is different. Inundation here is more often partial than general, and at the height of its freshes, the Persian wheel may be seen watering fields on the verge of its banks. The *Kurreef* and *Rubbee* (Autumn and Spring) harvest affords the most conclusive evidence in this case. The crops of the first are produced from an irrigated, and those of the latter from an inundated, soil; while the weight of the *Kurreef* harvest is to that of the *Rubbee* nearly as two to one.

On inspecting the accompanying chart of the Upper Indus, it will be seen that the river has double banks, or inner and outer ones. The first of these is as changeable as the navigable channels of the Indus, the latter as permanent as the river's course; the inner banks from its bed in the cold season, when the water is low and permanent, hem in the floods and freshes of an opposite season. The following Table will further illustrate this interesting feature of the Indus, though I believe it is one common to all rivers flowing through plains:—

Outer and inner Banks of the Indus.

<i>Parallel of Latitude.</i>	<i>Dry season Surface Water.</i>	<i>Width of the Dry flat.</i>	<i>River's Bed. Surface Water in the freshes.</i>
26° 28' N.	1456 yards.	788 yards.	2244 yards.
26° 44'	658 do	1560 do	2218 do
27° 18'	850 do	3004 do	3854 do

The double banks accompany the Indus after it has left the mountains at Kalabagh for the remainder of its course. Were the permanent continuous, the inundation would be restricted to narrow and defined limits; but as this is not the case, I will endeavour to point where this barrier is broken or wanting.

From Attock to Kalabagh.—No inundation.

From Kalabagh to Mittun.—It may be generally remarked, that in the northern part of the Upper Indus, there is no inundation, while in the south, or lower part of its course, the flooded districts are of a considerable extent, as a reference to the chart will shew.

Mittun to Bukkur.—Neither on the east or west banks of this division is there an outer bank, and the consequence is, that the country here is largely inundated. In the Mozarry districts, the floods of 1837 fell twenty miles back from the river; but in ordinary seasons twelve is the more usual measure of their width. On the opposite bank, the inundation about Subzalkote reaches to the edge of the desert.

Bukkur to Sehewan.—Though the permanent banks may be traced in this section, their outline is broken, and the low districts behind them overflowed in the freshes. South of Sehewan inundation of the west bank is general, though the quantity of uncovered land exceeds that submerged. Chandkote, the most valuable province in Sinde, is situated here, and its exuberant crops are to be attributed to its great command of water. Upon the opposite bank, between the river and the desert, is a strip of alluvium, the medial width of which is four miles. This belt marks the extent of the flooded districts; but for some years past, there has been scarce any inundation upon this side of the river.

Sehewan to efflux of Fulailee.—The Tela mountains for some distance below Sehewan prevent the river from expending in a westerly direction, and a creeping hilly ridge serves the same purpose further South. On this side of the river, the inundation is confined to a very narrow belt; on the opposite side the desert opposes any outlet to the East, and here, though the inundated belt be wider than that upon the West bank, its breadth cannot be estimated at more than three miles.

Efflux of Fulailee to the Sea.—The Delta of the Indus may be said to commence from the efflux of Fulailee. The lower portion

of it only is under water, and the inundation here as in the upper course of the river is partial; the submerged part is a belt fringing the sea, measuring in width about twenty miles.*

X.—Fords of the Indus.

There are properly speaking no fords on the Indus below Attock, that is, there is no spot in its course where their annual occurrence is so certain as to warrant a dependence on their existence in any subsequent military operations, of which the banks of this river may become the scene.

But that the Indus is at times fordable is certain, and in the course of my inquiries on the subject, I have met with many individuals who assured me of having done it. What may be done once, may be performed a second time, and when a solitary unassisted *Moohaud* can cross, it is just as possible that a regiment of infantry may follow. A ford open to a foot soldier, would prevent no difficulty to horse. The practicability of fording the river being once admitted, becomes a subject of importance, and viewing it in this light, I shall devote more space than I otherwise should to its consideration.

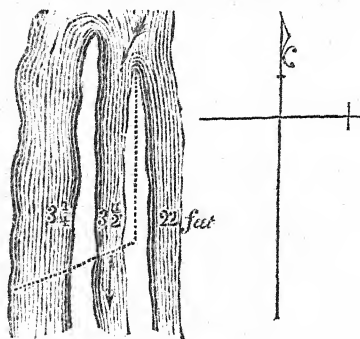
The months in which the river is fordable, are December, January, February, and March. No instance is on record of its having been done either north of Mittun, or south of Hyderabad in Sinde. The Indus does not within the excluded track run deeper than in that portion of its course where the river is known to be fordable; but being less frequented by the boatmen, its capabilities are not so generally known.

The fords are discovered by the annual fleet of grain boats, which descend in the cold weather from the Upper Provinces to Lower Sinde. Some boats in this fleet are of so large a draft, that their safe navigation calls for the most minute survey of the river's channels, and it is whilst so employed that the boatmen sometimes find they have crossed, almost unknown to themselves, from one bank of the river to the opposite, without once having had to swim.

* These observations on the inundation of the Indus south of Mittun are given with much deference, as I have not had proper opportunity of inquiry. This does not apply to any remarks on this subject above Mittun.

During the dry season of 1836-37, I had frequent intimation of fords; but was not fortunate enough personally to discover one, for it so happened, that by the time I had got to the spot, they had always disappeared. The following sketch is taken from a trust-worthy person, whom I had sent to report on a suspected locality :—

Ford in the neighbourhood of Halá.



The centre channel is here the continuous one; that on the east side was however the deepest, and discharged the most water; but its mouths were closed up by shoals. Forty-two boats were lying above the ford, waiting for the channel to open; this was on the 27th February. The dotted line shews the ford. On this subject I am glad to have the testimony of Dr. Gordon, the officer who went from Loodiana to Bombay with the Maharajah's (Runjeet Sing) mercantile speculation. He tells me, that some distance north of Hyderabad, he came upon a shoal stretching completely across the river, when many grain boats unable to pass over it, were lightening their draft by transporting a portion of their cargo into smaller boats. Dr. Gordon finding more water above the shoal than the boats in his charge drew, held on his course.

The custom of bridging the Indus by boats at Attock, has prevailed since the days of the Greek invasion, and it appears to me, that the same might be used with equal success to cross an army much lower down the river.

The place most adapted for this purpose, whether viewed merely with reference to the river itself, or to the Afghan Passes that lead down upon it, and which have not been unaptly termed the gates of Khorassan, is Bukkur fort. Here we have a permanent channel, both

banks of the river being faced with hard flint hillocks, while in the middle of the stream are some islets of the same material, on one of which is the ford, and contiguous to it, or rather adjoining it, another, containing the tomb of Peer Khaja Khizr. At no other spot below the mountains, does the Indus present similar facilities for bridging. The channel here is as follows :—

Above the fortress the river widens to..... 1244 yards.

In a line with the fort it is less, say 1000 do.

The channel between the fort and the west
bank of the river, is by measurement..... 98 do.

Ditto ditto on the opposite side of the fortress,
estimated 400 do.

Width of fortress and Isle of Khaja Khizr, 502 do.

1000 do.

Depth of the Channels.

West Channel 98 yards measurement.

Current 2.9 knots.

5,6,7,9,12,15,9,3 feet.

East Channel 400 yards ; estimated

Current 3.7 knots.

7,7,9,9,9,12,12,13,15,18,30,24,12ft.



A spit projects from the north-west end of the fortress, and extends to within fifty yards of the west bank. In this gut the current is four knots an hour, the depths were 6 6 7 7 6 6 6 5 5 feet ; at the time these measurements were made, the river had 12 feet more to rise. In fact it was when at its lowest level.

Last June I had an opportunity of examining this bridge of boats at Attock, it contained thirty-six boats, and the river, when they were moored, had a width of 540 feet, its depth by measurement taken the preceding year was 10 fathoms, and the current about 6 knots an hour. By comparing this account of the Attock bridge, with the details of the river at Bukkur, it is evident that circumstances are greatly in favour of the former ; but surely, if a few untutored boatmen succeed so well at one place, we ought not to despair of our success at Bukkur.

The chief, in fact the only difficulty is, mooring the boats, and to effect this, the Seiks use an anchor of a form the very worst that could be imagined, and which has no other recommendation than its antiquity, and perhaps the ease with which it can be dropped from the boats. The figure is pyramidical, a skeleton of wood filled with stones. These uncouth things, when once let go, cannot be recovered, and as the strength of the bridge is not proof against that of the current in June, July, August, and September, a new set has to be made as often as the bridge is required to be constructed. Now were a line of mooring anchors once laid down in place of these wooden baskets, and beyond chain bridles attached to them, a bridge of boats could be put together in about as many hours, as days and weeks are now consume in preparations.

The number of boats required to form a bridge, would be built of a form the best that science could propose, and always kept in a state of readiness to haul out to their several berths, numbered as the buoys would be, 1, 2, 3, &c. A bridge so formed, would be a very solid construction, and able to brave, under proper superintendence, the strongest freshes in the Indus, whether abreast of Attock or under the fort at Bukkur. Should it become necessary to destroy it, one end of the bridle chain has only to be slipped and the mooring anchors are useless to an enemy. But little weight is due to the opinion of men, who not conversant with military affairs, cannot be expected to have clear ideas on such a subject. But still I venture to hold the opinion, that bridging the Indus at Bukkur, is a practicable question.*

The difficulty would be to moor boats in the eastern channel; but this once accomplished, the bridge might be made permanent, as the small western channel might serve for the navigation of the river.

XI.—Of a Site for a Fair.

While Government has it in contemplation to establish an *entrepôt* for trade on the banks of the Indus, it will not be irrelative

* I need not observe that this was written before Capt. Thompson (Bengal Engineers) threw his noble bridge across the river, by which the British army crossed in 1838, with their baggage and battering train.

to the subject of this report, briefly to say a few words on the locality of those towns where the mart is likely to be fixed.

This question will perhaps be ultimately decided more by the existing foreign relations of the different towns, at the time when this selection is made, than with reference to their geographical position, or their local site. Shikarpoor has hitherto been excluded from the list of places best adapted, to answer the purpose of Government; but in the turn which current events may give to the political relations of Afghanistan, that town may yet become one of the *entrepôts* for the trade of Central Asia.*

Shikarpoor is not destitute of collateral advantages. The large money transactions of its bankers; the extent and skilfully organized agency which they have diffused, are known to all interested in these matters; though the advantages of such an establishment can be duly appreciated by merchants themselves. With steamers upon the Indus, the proximity of the town to Bombay, the market for Europe goods is favourable to its site as a mart; and were Bukkur fort in our possessions, the British flag upon that fortress would win confidence by guaranteeing security.

The *Zeearat* of Khaja Khizr, a *peer*, alike worshipped by Mahomedan and Hindoo, adjoins the fort of Bukkur, and on the anniversary of a certain day in April, multitudes of both creeds flock to this shrine. Opposite, in the town of Roree, is a place of pilgrimage of still greater sanctity; for here, say the faithful, is preserved a lock of the prophet's hair.

The distance of Shikarpoor from the river, operates unfavorably to its becoming a commercial mart; it lies eighteen koss inland of its port of Shukur. From May to September inclusive, boats can come up to the town by means of a fine canal, called the Sinde, and were this work deepened and connected with the Larkhana canal or the Noroab canal of the Indus, we should have an inland navigation throughout the year, between Sehewan and Shikarpoor. It would traverse the richest portion of the Sindian territories, and evade an intricate passage of 100 coss upon the main river. So admirably is the country adapted for this means of transit, that

* It is a proof of Lieut. Wood's judgment and sagacity, that his supposition is now in course of fulfilment.

throughout the entire line, not a single lock is necessary, save for occasionally cleaning the canal. The returns would be great, and the outlay very moderate compared to that of similar work in countries where natural obstacles have to be surmounted, and labour is a more valuable commodity than in Sind.

The country around Shikarpoor is subject to inundation; but west of the town, and contiguous to the suburbs, is a dry plain, where buildings to any extent could be erected.

I do not believe there is a healthy spot on the banks of the Indus; in this respect there is little choice; some towns have ailments peculiar to themselves; but from the day the river begins to fall in September to the end of November, asthma and fever are common, from the mountains at Kalabagh to the sea.

Bukkur fort and Roree are built upon hillocks of flint, which though not high, render both these places more healthy than towns in the plains. The first is a fortified islet amid channel, and Roree overhangs the left bank of the river, with a depth of four fathoms water under the walls. As a *dépôt* for military purposes or an *entrepôt* for commerce, much could be written in favour of both these places.

Mittun.—The geographical position of Mittun is superior to that of any town upon the Indus. In addition to commanding of both the Indus and Punjaub streams, it stands midway between the gates (as the natives term them) of Khorassan, namely, the passes of Bolan and Sakhi Surwar, while immediately behind it are the entrances of the former pass by the auxiliary routes of Assui and Hunnund. The town is built upon a small artificial mound, and when the freshes are in the river it is surrounded on three sides by water; it is two miles distant from the Indus, but from the middle of June to the 22d of September, boats can discharge or take in cargo immediately under the town, by means of a fine natural water-course, navigable down the Bangalah and Omerkote. South of Mittun, is a dry plain that fringes the above nullah; and should this town be preferred for the site of a fair,* it is on the bank of this stream that booths and other buildings should be erected. During the inundated months, camels cannot travel north or west of Mittun. The inhabitants prefer well-water to that of the Indus. When

* Since selected for the purpose.

the river has been falling for four or five successive days, to drink the nullah water is almost certain to bring on an attack of illness; this the natives attribute, and I think very properly, to the vegetable matter which must be brought into the water-course, by the drainings of the inundated districts. Mittun, and the village of Chatchur upon the opposite bank can, taken together, supply forty boats of from one hundred maunds burden to one thousand.

I ought before to have said that cutaneous eruptions trouble the inhabitants of Mittun; the sores frequently become ulcered, but though difficult to heal, the disease does not appear to affect the general health.

Dera Ghazee Khan.—This town has been more than once endangered by the inundation when Nawab Jubber Khan, the brother of Dost Mahomed Khan of Cabool, was governor of the province; a wall that surrounded the town had to be thrown down to keep the water out, nor is there within a circle of many miles a spot exempt from its effects. Dera Ghazee Khan is situated about four miles from the river; but in the swell, like most of the other towns upon the Indus, it has a large navigable canal, by which it may be approached by boats for some months. Dera Ghazee Khan has, however, advantages that it will be difficult to set aside; the town lies at the foot of a pass in the Soliman mountains, that leads both to Cabool and Candahar, while it is equally central with respect to the Indian routes. It is the largest town upon the Indus, and even under the Sikh rule, it wears an appearance of increasing prosperity. Its merchants, though they do not speculate largely, have an extensive agency, and a considerable command of money. The country around yields heavy crops of grain, and the staples of cotton and indigo, while its home manufactures of silken stuffs, such as gool buddens, timorees, &c. is only equalled by the manufacturing marts of Bhawalpoor and Moulton. When to the above recommendations are added, the fairs at Peer Adul and Sakhi Surwar, I believe that every thing considered, Dera Ghazee Khan, or rather some spot in its vicinity, will at once be considered the most eligible place to lay the foundation-stone of an Indian St. Macrera. By a reference to the map it will be seen, that Sakhi Surwar and Peer Adul, are towns in the district of Dera Ghazee Khan; at each of these places, a large *Mela*, or fair, is annually kept; that of Sakhi Surwar

occurs in the Indian month Visukh, answering to our March. It is held in honour of the *peer*, after whom the place is named; the fair lasts five days, and pilgrims from India's furthest shores come to prostrate themselves at the tomb of Sakhi Surwar. Few come from the countries west of the Suliman range; and the followers of Brama out-number those of Mahomed; the aggregate of both cannot be much under 100,000 souls. Though commerce is not neglected, there is but little business done.

A Khorassan or Afghan horse-dealer may now and then exchange an animal of his stud for the productions of India, or the manufacture of Europe; but this *Mela* is essentially an assemblage for devotional and pleasurable purposes; but with such a material, and the example of the holy Mecca, it is easy to fortel that (when the fair is established,) many individuals in this annual concourse of devotees will become as enterprizing merchants as they are now zealous and bigotted *fakeers*. Sakhi Surwar is twenty-four koss nearly direct west of Deera Ghazee Khan; it is a considerable town situated in the mouth of the pass. Firewood is abundant, and a mountain rivulet supplies the town with water. At Peer Adul Zeearat, seven koss in a N. W. direction from Dera Ghazee Khan, a fair is held in February, similar to that of Sakhi Surwar.

Dera Ismail Khan is never inundated from the river, but is yearly flooded by mountain torrents. The present town lies about a mile back from the river, and was built about eight years ago, when the old Dera was washed into the Indus. Dera Ismail Khan is well planned, and when its skeleton streets are filled with occupants, they, for width and cleanness, will match with those of most eastern towns. The houses are of mud or sun-dried brick, terrace roofed, and rise from a ground platform of from one to two feet high. Few are of more than one story. When I passed through it in the middle of summer, the bazar was well frequented; but in the winter months it is much more thronged. The town is a sort of nucleus or rallying point for those pastoral tribes of Affghanistan, who prefer a clement winter in the valley of the Indus, to the security of that which characterizes that of the mountain districts of their own land. Carriage is thus almost unlimited, as some of the tribes rear camels for no other purpose than to put them out to hire. The *Lohanas*, who from before the time of Baber

have been the great carriers and traffickers of these countries, still frequent Dera Ismail Khan. The transit trade of India and Affghanistan is already fixed here, and if the routes radiating from the town are considered merely in reference to Cabool, then is Dera Ismail Khan better situated for a commercial mart than towns lower down the river.

These are all the places that present themselves as eligible spots for the establishment of commercial *depôts* west of the Indus; but should it ever become an object to Government to have the mart within their own frontier, then Leia, upon the Indian bank of the river, lying between the two Deras, is its proper site.

But to give full effect to these fairs, it is desirable that two be established, one for the lower Indus and one for the upper; the latter will supply, besides the markets of Affghanistan, those of Central Asia beyond the Parapamisan chain. The other, by the roads of Kandahar* and Kelat,* will draw from Beloochistan, the districts around Herat, and the southern provinces of Persia, their staples of wool, assafoetida, and madder; while in return, it can supply the whole of this extensive region with the growth of India and manufactures of the British Isles, at a cheaper rate than can be done by any other route. Thus, should a general war in Europe exclude England from the Black Sea, an outlet equally good for the staples of her trade is offered by the Indus, with an *entrepôt* at Bukkur and another in the Derajat.

XII.—*Indus and Punjaub Rivers.*

Travelling over the Punjab, in a westerly direction, when its rivers are in flood a little above the parallel of Kalabagh, no less than five streams are crossed, each occupying a larger bed, and seeming to the eye, a more important river than the Indus.

The Punjab rivers, as are well known, fall into the Indus in one stream, and if we call our attention to the confluence of the united volume with the latter, the result is strikingly at variance with appearances and pre-formed opinions.

* The port of Sommeeanee seems by recent accounts to be most favoured by importers, and I understand that merchants are only awaiting the pacification of the country, to commence carrying thence, *via* Biela and Kelat.

About the middle of May, I examined both when the relative size of the Indus and its Indian feeds stood as follows :—

Indus, or Sind.

Width 608 yards, max. current
4.8 knots, $\frac{3}{4}$. 1.1.1.1.1.1. $\frac{1}{4}$. $1\frac{1}{2}$. $1\frac{1}{2}$. $1\frac{3}{4}$.
2.2. $2\frac{1}{4}$. $2\frac{1}{4}$. $2\frac{1}{2}$. $2\frac{1}{2}$. $2\frac{1}{2}$. $2\frac{1}{2}$. $2\frac{1}{4}$. 2. $2\frac{1}{2}$. 2.
 $1\frac{1}{4}$. $1\frac{3}{4}$. $\frac{3}{4}$. $\frac{1}{2}$ fathoms. Discharge
per second 91.719 cubic feet.

Chenaub, or Punjaub.

[illegible]

Here the principal cause of the disproportionate size of the Indus is the early commencement of its freshes. Indebted for its periodical rise principally, if not solely, to snow-clad mountains, an increase is first perceived in its stream when the sun comes into our northern latitudes at the vernal equinox in March; but the Punjaub rivers depending upon theirs upon another and less constant source, namely, the rainy season of Hindostan, have their freshes later. At the time of my examination in May, the Sutlej, the most eastern of the Punjab rivers, was at its lowest level; while the Jalum, the most western of the five rivers, and the one which has its source nearest to that of the Indus, had already shewn signs of rising; from which I am inclined to think, that measurements made in July would give, if not an entirely different, a less disproportionate result in the amount of water discharged by the Indus and its Punjaub auxiliaries.

But that the Indus is a superior river to the Punjaub, seems very clear; and amongst the collateral proofs of this which may be urged, is the direct nature of its course, compared with those of the Punjaub streams. Also the dread in which the river is viewed by the *Mohanas*, who, were the choice left to themselves, would prefer dragging their boats twenty coss up the Chenaub, to half that distance upon the Sindé.

Another circumstance connected with these two rivers is worthy of notice; in the Doab, or country lying between them, all canals are cut from the Sindé, in the month of July, when both rivers are in the flood, the surplus water of the Sindé pours down into the Chenaub, proving that though their beds for a distance of sixty miles are not more than ten miles asunder, yet that in their relative level, there is a considerable difference.

It appears to me, that Captain Burnes must have erred in giving so large a fall as twelve inches a mile to the Punjaub streams, and but half that quantity to the Indus. In the dry weather, the latter river has most decidedly a much stronger current, than any of these streams, and even in the freshes, their current as far as I have been able to observe the Punjaub rivers, is not so strong as that of the Indus. On the 27th of June this year, the current of the Roree at Lahore was not more than three knots an hour, and neither that of the Jalum or Chenaub exceed four.

XIII.—*Concluding Remarks.*

It has been matter of regret, that so noble a river as the Indus, should have no port accessible to vessels of burden.

The disappointment is, however, more imaginary than real. If indeed the merchant is necessitated to employ ships of 4 and 500 tons burden, such a class of vessels cannot enter the river, and he must land his goods at Curachee, the only port in Sind open to vessels of this description; but if, on the contrary, he prefer water carriage to land portage, why not avail himself of tonnage? In the fair season, hundreds of boats frequent the mouths of the Indus; they are the common coasting vessels of Cutch, and none of them exceed, when laden, a draft of nine feet. The average draft is six and seven. I believe that the principal mouth, namely, one that discharges the greatest body of water, will even be found the least navigable, and that the port of the Indus, though it may fluctuate between the Luckput creek and Curachee, will always be situated in a secondary branch, discharging little or no fresh water, but connected with the main stream by a creek or navigable channel, open only to the flat boats of the river. But even admitting that a vessel drawing seven feet water could get upon the main trunk, nothing would be gained, as no other description of vessel but the light drafted steamer already noticed, will be found to answer upon the Indus, and such vessels will be able also to keep up the communication between the sea-going craft and the main river. If then a portage is thus shewn to be unnecessary merely to give free access to the river, it is equally useless by way of avoiding the difficulties of navigation in any

particular part of its course. In my former report, I did indeed advocate the plan, but I did so then from hearsay. Now I give the result of my own observation. The navigation of the Delta is certainly intricate; but the difficulties are not so insurmountable to render a portage desirable, nor does the river improve so much above it, as I was at the time given to understand.

In one respect, the authorities on the river have it in their power to confer a considerable boon on the navigation of the Lower Indus. The only obstacle in the river, from which danger is to be apprehended, and which no attention can effectually guard against, is sunken trees. Now the river brings down none of these from the mountains. All come from the *shikargah*, or hunting preserves of the Sinde Ameers. The supply might be cut off without material injury to these forests, or interfering with their Highnesses' amusements. Let the Ameers but give an order, that between the *shikargah* and the river, a clear belt of twelve yards wide be left, and in a few weeks their numerous foresters will have cut down a twelve months' fuel for our steamers, and insure a path for the trackers.

As these forests do not extend north of Sehewan, the operation would not require to be carried above that town, the jungle wood there being too small to affect the channels of the river.

TABLE No. I.

Comparison of Chronometers.

Date.	Chronometers.		Differences.	
	No. 256.	No. 257.	1st.	2nd.
1836.				
Dec. 27th	4 18 00	4 31 05	13 "05	2.0
28th	4 13 30	4 26 37	13 "07	2.0
29th	4 26 50	4 39 58.5	13 "08.5	1.5
30th	4 11 15	4 24 25.5	13 10.5	2.0
1837.				
Jan. 1st	4 12 35	4 25 49	13 14	1.7
2nd	4 36 05	4 49 21	13 16	2.0
10th	4 45 35	4 58 06.5	13 31.5	1.9
11th	4 42 35	4 56 08.5	13 33.5	2.0
12th	4 48 20	5 01 55.5	13 35.5	2.0
Feb. 15th	11 51 35	12 06 23.5	14 48.5	2.0
20th	11 18 30	11 34 31.0	15 01.0	2.5
26th	10 49 15	11 04 28.5	15 13.5	2.1
March. 1st	10 48 00	11 03 19	15 19	1.8
5th	11 09 50	11 25 16	15 26.0	1.9
9th	4 38 00	4 53 32.5	15 32.5	1.8
April 9th	4 18 30	4 34 59	16 29	0
14th	4 02 21.5	4 19 00	16 38.5	1.9
17th	4 24 14.5	4 41 00	16 45.5	2.3
18th	4 00 12	4 17 00	16 48	2.5
19th	3 49 10	4 06 00	16 50	2.0
20th	3 54 37.5	4 11 30	16 52.5	2.5
27th	3 34 49	3 52 00	17 11.0	2.6
29th	4 00 14	4 17 30	17 16	2.5
May 19th	3 35 56	3 54 00	18 04	2.4
20th	2 51 53.5	3 10 00	18 06.5	2.5
1838.				
July 16th	9 59 00	5 47 07.5	4 11 52.5	3.5
17th	8 03 00	3 51 05	4 11 55	2.5
18th	9 56 58	5 45 00	4 11 58	3.0
19th	9 43 00	5 30 59	4 12 01	3.0
20th	7 43 00	3 30 56	4 12 04	3.0

TABLE No. 2.

From Mittun to Dera Ghazee Khan. The Time-keepers were examined at Mittun, and again at Dera Ghazee Khan. The following Table shews the result of each rate, while for the Longitude it gives a Mean of both.*

Stations.	Latitudes.	Diff. Longitude by		Mean.	Longitude.
		Mittunkote.	Dera Ghazee Khan.		
No. 1	28°58'25" N.				
2	29°04'38	03°57	04°21	04°9	70°30'34" E.
3	29°04'49	10°45	11°10	10°37	37°22
4	29°23'41	12°54	13°31	13°12	39°37
5	29°31'53	25°36	26°20	25°58	52°23
6	29°42'00	25°15	26°01	25°38	52°3
7	29°53'00	28°34	29°20	28°57	55°22†
8	30°06'02	27°34	28°04	28°4	54°29

Dera Ghazee to Dera Ismail Khan. The Watches were examined at these places, and the following Table gives the Longitude of the intermediate stations, deduced from a Mean of the old and new rates.

Stations.	Latitudes.	Diff. of Longitude by rates.			Longitude.
		Old.	New.	Mean.	
No. 1	30°33'19	02°00 E.	01°51 E.	01°55 E.	70°56'24 E.
2	30°56'49	01°00 W.	01°18 W.	01°09 W.	70°53'20
3	31°09'09	01°10 E.	00°39 E.	00°52 E.	70°55'24
4	31°24'55	04°42	04°24	04°33	70°59'02
5	31°37'16	09°57	09°21	09°39	71°04'08
6	31°42'30	05°03	04°24	04°43	70°59'12
7	31°47'54	06°30	05°50	06°10	71°00'39

* Mittun was fixed from Roree.

† Indifferent.

TABLES,

In which the Geographical position of points and places in the line of the Indus, as they stand in the published Maps, are compared with the Observations of the present Mission.

No. 3.

From the Sea to Mittun.

Places.	Latitude.		Longitude.	
	Map.	Mission.	Map.	Mission.
	° ' "	° ' "	° ' "	° ' "
Barree Gorah, ...	24.12.00 N.	24.13.20 N.	67.54.30 E.	67.36.00 E.
Efflux Hejamree,	24.08.42	24.16.42	67.57.00	67.47.03
Tatta Bunder, ...	24.44.00	24.44.30	68.19.00	68.01.06
Hydrabad do. ...	25.22.00	25.22.04	68.41.00	68.23.03
Sehewan do.	26.22.00	26.22.35	68.09.00	67.55.17
Roree do.	27.43.29	27.41.59	68.56.00	68.55.39
Chatchur do.	28.53.29	28.52.07	70.31.00	70.27.57
Mittun do.	28.54.00	28.53.19	70.29.00	70.26.25

No. 4.

Mittun to Attock.

Places.	Latitude.		Longitude.	
	Map.	Mission.	Map.	Mission.
	° ' "	° ' "	° ' "	° ' "
Nowshaira,	29.11.00 N.	29.12.19 N.	70.38.00 E.	70.35.28 E.
Raick,	29.21.00	29.24.20	70.45.00	70.39.01
Sherroo,	29.42.00	29.42.00	70.58.00	70.50.03
Dera Ghazee Khan,	29.58.00	30.03.26	71.00.00	71.51.23
Dera Dean Pemah,*	30.40.00	30.33.19	71.06.00	71.00.24
Ditto,†	30.51.30	30.39.20	70.57.30	
Leia,	31.08.00	30.58.01	71.05.00	70.59.23
Rajun,	31.14.00	31.08.39	71.06.00	70.57.42
Khahree,	31.30.00	31.24.25	71.01.00	70.54.02
Bukkur,	31.44.00	31.37.16	71.14.00	71.06.28
Dera Ismail Khan,	31.57.00	31.48.39	71.07.00	70.59.30
Kalabag,	33.07.00	32.57.36	71.49.00	71.35.23
Confluence of Sehewan,	33.10.00	33.01.48		
Attock,	33.55.40	33.53.53	72.27.00	72.16.27

* East bank.

† West bank.

TABLE No. 5.

Sectional or Cross River Soundings. 1st, in the Delta in the months of December and January.

Parallel of Latitude.	Soundings.	Widths.
24° 17' N.	5.6.7.6.5½.5.4½.4.4.3.2.2.2.1¾.1½.1.1½ fathoms....	
19	¼.2.3½.4.4½.6.5½.5½.6.4.3½.3½.3.3.2½.2½.2¼.2.2. 2.2.2½.	734 yds.
21	1½.1½.2.3.3½.3½.1½.1½.2.2.3.2½.2½.2½.1.2.2½.2. ...	631
26	1½.1½.1½.1½.1½.1½.1½.1½.1.1½.1½.1½.1½.1½.1½.1¾. 1¾.1¾.1¾.1¾.1¾.1¾.1¾.	455
28	1.1.1.1¼.1½.1¼.2.2¼.2.2.2.2.1½.1½.1½.1½. ...	1277
34	¾.¾.¾.¾.1.1¼.1¼.1½.1½.1¼.1¼.1½.1¾.2.2.2.2¼.2¼. 2¼.2¼.1.1.1.½.½.	
37	1.1.1.1.1.1¼.1¼.1¼.1¼.1¼.1.1.1.1¼.1½.1.1.1.1.1¼. 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.¾.¾.½. ...	841
44	1.1.1.½.3.3.3.4½.3½.3.2.1½.1.1.1.1.¾.¾.½. ...	691
47	½.½.½.1.1.½.¾.1.½.2.3.3½.3½.3½.3.	
48	½.1.½.½.2.2¼.4.1.1.1.3.3.3.3.3½.3½.2½.2.1¾.1.1. 1.½. 1007 dry. 1.1.1.1.½.	1132
50	1.2.2½.2.2.1½.1½.1.2.2.1¼.2.2.2.1¾.1½.1½.2.1.1.1. 1¼.2.¾.	

Between the Delta and Sehewan, in the months of January and February.

Parallel of Latitude.	Soundings.	Widths.
54	1.1.1¼.1¾.2.1½.1.1.1.1¼.1.1¼.1¼.1½.1½.1½.1½. 1¾.2.1½.1.	780 yds.
58	1.1.1½.1¾.2.2.2.2.2.2.1¼.1.¾.¾.¾.¾.¾.1.¾. ... 1.1¼.1.1.1.2.1¾.1¼.1¼.¾.½.	978





Between the Delta and Sehewan, in the months of January and February.—(continued.)

Paralle of Latitude.	Soundings.	Widths.
25° 00'	$\frac{3}{4} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot 1 \cdot 1 \cdot \frac{1}{4} \cdot \frac{1}{2} \cdot 2 \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot 1 \cdot \dots$	834 yds.
13	$1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 3 \cdot 3 \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot 1 \cdot \dots$	590
19	$3 \cdot 3 \cdot \frac{1}{2} \cdot 3 \cdot \frac{1}{2} \cdot 3 \cdot \frac{1}{2} \cdot 3 \cdot 3 \cdot 2 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \dots$	400
22	$\frac{3}{4} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot 1 \cdot 1 \cdot \frac{1}{2}$ $1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot 1 \cdot \frac{3}{4} \cdot \text{---} \cdot 1 \cdot \frac{1}{2} \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot \dots$	—
25	$4 \cdot \frac{1}{2} \cdot 3 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 2 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \dots \dots \dots$	518
31	$1 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{3}{4} \cdot \frac{1}{2} \cdot \dots$	460
35	$\frac{1}{2} \cdot 2 \cdot 1 \cdot \frac{1}{2} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{3}{4} \cdot 2 \cdot \frac{1}{4} \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot \frac{3}{4} \cdot \dots$	700
26° 00'	$1 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{3}{4} \cdot 2 \cdot 2 \cdot \frac{1}{4} \cdot 2 \cdot 2 \cdot 2 \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \dots$	522
11	$1 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot 2 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{2} \cdot 2 \cdot 2 \cdot 2 \cdot 1 \cdot \frac{1}{2} \cdot 1 \cdot \frac{1}{4} \cdot 1 \cdot \frac{1}{4} \cdot \dots$	600
16	$3 \cdot 4 \cdot 4 \cdot \frac{1}{4} \cdot 4 \cdot \frac{1}{4} \cdot 3 \cdot \frac{1}{2} \cdot 2 \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{2} \cdot 2 \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot \frac{1}{2} \cdot 2 \cdot \frac{3}{4} \cdot 1 \cdot 1 \cdot$ $1 \cdot 1 \cdot \frac{3}{4} \cdot 1 \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{1}{2} \cdot 3 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot \frac{1}{2} \cdot 2 \cdot 2 \cdot 1 \cdot 1 \cdot \dots$	1000



Between Sehewan and Bukkur, in the months of February and March.

Parallel of Latitude.	Soundings.	Widths.
24,	$\frac{5}{4}, \frac{5}{4}, \frac{5}{4}, 1, 1\frac{1}{4}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}$. $1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{4}, 1\frac{1}{4}, 1\frac{1}{4}, 1\frac{1}{4}, 1, 1\frac{1}{2}, \frac{1}{2}, \odot, \frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{2}$. $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \odot, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 1, 1\frac{1}{2}, 1\frac{1}{4}, 2\frac{1}{4}$. $2\frac{1}{2}, 2\frac{1}{2}, \dots \dots \dots$	1684 yds
28	$1\frac{1}{2}, \frac{5}{4}, \frac{5}{4}, \frac{1}{2}, \frac{5}{4}, \frac{5}{4}, 1, 1, 1, 1\frac{1}{4}, \frac{5}{4}, \frac{5}{4}, 1, 1, 1, 1, 1\frac{1}{4}, 1\frac{1}{4}, 1\frac{1}{4}, \frac{5}{4}, \frac{5}{4}$. $1, 1, \frac{5}{4}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{4}, \frac{5}{4}, 1\frac{1}{2}, 2\frac{1}{4}, 2\frac{1}{4}, 1\frac{1}{2}, \frac{1}{4}, \frac{1}{2}, \frac{1}{2}, \frac{5}{4}, \frac{5}{4}, \frac{1}{2}, 1$. $1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{4}, 1\frac{1}{4}, 1\frac{3}{4}, \frac{5}{4}, \frac{1}{4}, \dots \dots \dots$	1456
41	$2, 2, 2\frac{1}{4}, 3\frac{1}{4}, 2\frac{1}{2}, 2\frac{1}{2}, 2\frac{1}{2}, 1\frac{1}{2}, 2, 2, 2, 1\frac{1}{2}, 1\frac{1}{2}, 1\frac{1}{4}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}$. $1, 1, 1\frac{1}{4}, \frac{5}{4}, \frac{5}{4}, \frac{5}{4}, 1, 1, 1, \frac{5}{4}, 1, 1, \frac{5}{4}, \dots \dots \dots$	763

Between Sehewan and Bukhur, in the months of February and March.—(continued.)

Parallel of Latitude.	Soundings.	Width.
42'	1. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{5}{4}$.  $\frac{5}{4}$. $\frac{5}{4}$. $\frac{5}{4}$. $\frac{5}{4}$. 1. 1. 1. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$.  $\frac{1}{2}$. $\frac{1}{2}$.  $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$.  $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. 1. $\frac{1}{4}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. 1. ...	1600 yds.
44'	$\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{2}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{2}$. $\frac{2}{4}$. 3. 3.	658
45'	$\frac{1}{2}$. 1. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$	452
27° 10'	$\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. 1. 1. $\frac{5}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$	622
18'	$\frac{1}{2}$. $\frac{5}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{3}{4}$. $\frac{4}{2}$. 4.	850
29'	$\frac{1}{2}$. $\frac{2}{4}$. 3. 4. 4. $\frac{4}{2}$. 4. 3. 3. 3. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$	690
40'	$\frac{1}{4}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{1}{2}$. $\frac{2}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{5}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{5}{4}$. $\frac{5}{4}$. $\frac{5}{4}$. 1. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. 3. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{1}{4}$. 1.	1896

Between Bukhur and Mittun, in the month of April.

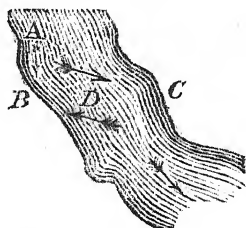
Parallel of Latitude.	Soundings.	Widths.
27° 58'	$\frac{2}{4}$. 4. $\frac{1}{2}$. 4. $\frac{3}{4}$. $\frac{3}{4}$. $\frac{3}{4}$. 3. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. 1. 1. $\frac{1}{4}$. $\frac{1}{2}$	561 yds.
28° 03'	$\frac{2}{2}$. $\frac{2}{4}$. $\frac{3}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{2}$. $\frac{1}{2}$. 1. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{2}{2}$. $\frac{1}{4}$. $\frac{2}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{2}{2}$. $\frac{1}{2}$. 1. 1. $\frac{1}{4}$. $\frac{1}{4}$. 1. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$.  $\frac{1}{2}$. $\frac{1}{4}$	1067
08	1.  $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{3}{4}$. 1. 1. 1. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. 1. 1. $\frac{1}{4}$. $\frac{3}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{3}{4}$. 1. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{2}$. $\frac{1}{4}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{2}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{1}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{2}{4}$. $\frac{3}{4}$. 3. ...	1123

<i>Current.</i>			miles.	yards.
The usual current in the freshes is,	...	...	5	992
When the freshes are strong,	...	...	6	1272
The greatest measured velocity,	...	...	8	323
Between Attock and Kalabagh, where the river is hem-				
med in by mountains, it is estimated in the freshes,	...	10		
In the dry season usual,	...	...	2	1376
Ditto ditto strong,	...	...	3	1248

In a channel 1855 yards wide, the current in the middle of July has been found to vary its strength in different depths as follows:—

$\frac{1}{2}$ fathom	.....	2·7 knots.
$\frac{3}{4}$ do.....		3·4 do.
1 do.....		4·7 do.
$1\frac{1}{2}$ do.....		2·9 do.
2 do.		4·8 do.
$2\frac{1}{4}$ do.....		5·8 do.

By experiments with Massey's patent Log Machine, the ground current of the Indus has been found equal in velocity to that of its surface.



When the stream *A* encounters the bank at *B*, it is thrown off in the direction *C*; that part of the bed called *D* is thus cut off from a further supply. An irregularity in the level is the immediate consequence, to restore which, a surface stream rushes up, as represented by the coloured arrow in the figure; but as the water at the bottom of the surface *D* runs off by the declivity of the river's bed, no equilibrium can take place, while a rotatory motion, fatal to the bank, is given to a large body of water in its immediate vicinity.

TABLE No. 7.

Tonnage upon the Indus.

		Kurwars from								No. of Boats.	Remarks.
		80	70	60	50	40	30	20	10		
Boats, ...	100	90	80	70	60	54	40	30	20		
Doondahs	7	33	47	50	70	70	100	100	150	627	Between the Sea and Bukkur.
Doondahs Tohruks,	0 0	0 0	0 0	0 0	0 0	0 0	0 60	11 0	0 0	11 60	Bukkur and Mittun.
Tohruks, Duggahs,	0 0	0 0	0 0	0 0	0 0	0 0	0 10	107 0	0 0	107 10	Mittun and Kalabagh.
Duggahs,	0	0	0	0	0	0	0	46	0	46	Kalabagh and Attock.
Total,	7	33	47	50	70	70	170	264	150	861	

Abstract.

Upon the Lower Indus are 627 boats carrying 25,530 Kurwars.

Do. Upper do. 188 do. do. 6,550 do.

Do. Attock, 46 do. do. 1,150 do.

Total, 861 33,230

Deduct for old and worn-out 161 5,635

Boats, 700 carrying 27,595 do.

Available between the Sea and Attock, in which neither fishing craft nor the boats of the Punjab rivers are included.

TABLE No. 8.

Price of Boats at Pind Dadur Khan.

A Tohruk, cedar built, of 100 mds. costs 100 Nanukshakee Rupees.

do.	200	do. 200	225	do.
do.	300	do. 300		do.
do.	400	do. 350		do.
do.	500	do. 450		do.
do.	600	do. 475		do.
do.	700	do. 500		do.
do.	800	do. 500—600		do.
do.	900	do. 600—700		do.
do.	1,000	do. 700—800		do.

TABLE No. 9.

*Hire of Boats.*On the Lower Indus Doondahs of 16 Kurwars $1\frac{3}{4}$ Korah Rs. per diem.

do.	do.	35	do.	$3\frac{1}{2}$	do.	do.
do.	do.	40	do.	$3\frac{1}{2}$	do.	do.
do.	do.	38	do.	$3\frac{1}{2}$	do.	do.
do.	do.	60	do.	$4\frac{1}{2}$	do.	do.

On the Upper Indus, Tohruks of 100 mds. at 10 Rs. Goondah per month.

Ditto ditto 700 ditto 60 ditto ditto.

And in the same proportion for Boats of a greater or less burden.

Note.

The Nanukshakee and Bombay Rupee are all equal. Goonda is one anna short of the Nanukshakee.

127 Korah=100 Rupees Bombay.

18 Mamads=1 Kurwar.

A Sketch of the Second Silver Plate found at Badakshân. By ALEXANDER CUNNINGHAM, ESQ.

In the seventh volume of the *Journal of the Asiatic Society*, at page 1047, was published a sketch of an ancient silver plate, obtained by the late Dr. Lord in Badakshân. In a letter to me, enclosing a drawing of a second silver plate, which he had fortunately obtained, he mentioned a fact regarding the first plate which is worth preserving; namely, that it "had been an heir-loom in the family of the Meers of Badakshân, who claim to be the descendants of Alexander the Great; and it had been sold by them in their distress, when they were conquered and imprisoned by Meer Morad Beg of Kunduz, to Atma Ram, his Dêwân Beghi."

Regarding the second plate, I cannot do better than quote Dr. Lord's own words: "I was aware there was a second *patera*, but I failed in all my attempts to get it when I was before in the country. I have now however succeeded; but find, to my astonishment, that its subject is not Grecian, but pure Persian; probably Shâpûr killing a lion, as seen in the Persepolitan figures. The *patera* is pure silver; weight 104 kaldâr rupees, (312 drs.) the workmanship of unequal merit; the heads of both man and horse, particularly the latter, appear to me far superior to the other parts; you will notice the peculiar way in which the horse's tail is tied up."

I can add nothing to Dr. Lord's description, except that the original silver plate is 11·2 inches in diameter; and that there is a short inscription of dotted letters on the back of the plates; which appear to me to resemble very closely the Pehlvi characters of the Sassanian coins.

Dotted inscription on the back of Dr. Lord's plate. For the *facsimile* copy of this



inscription, I am indebted to the kindness of Lady Sale.

In the four corners of the sketch, I have represented four coins, illustrative of the subject on the silver plate.

No. 2 is the obverse of a silver Sassanian coin, published in the *Journal of the Asiatic Society*, vol. vi. 14, fig. 1, by Mr. Prinsep,

from his own cabinet. The king's crescent head-dress is the same as that on the silver plate; and the position of the right arm seems to indicate, that it must have pointed a spear towards the indistinct object which is seen between the horse's fore legs, and which is probably the lion of the plate.

No. 3 is the reverse of an early Mahomedan copper coin, published by Mr. James Prinsep, as fig. 2, pl. 14, vol. vi, of his Journal. The obverse has a head and some illegible letters. I have lately procured a similar copper coin, on which the horseman faces to the right; on the obverse is an inscription in ornamental Cufic characters, "*Us sultan ul azem Ala-ud-dunya wa ud dîn;*" and above the horseman on the reverse are the remains of the letters of the name; and between the horse's legs is the word بامیان *Bâmiân*, the place of coinage. I suppose this coin to belong to Ala-ud-din Husên, Ghorî, who was called the Incendiary, after having mercilessly destroyed Ghazni, and put an end to the Ghaznivide dynasty.* The horseman I believe to have been copied from the coins of the Hindu kings of Lahore, of which No. 5 in the lower corner to the right is a silver specimen of Syâlapati Deva.

No. 4, in the left lower corner, is a gold coin of one of the later Guptas, on which the subject is the same as that represented on the plate; the only difference being that on the coin the horseman is using a sword instead of a lance. This coin may date about A. D. 500. The earlier coins of the Gupta family also display the same subject; but on them the lion is attacked by a bowman on foot; and on the reverse, the goddess Lakshmi is seen sitting upon the vanquished animal.

The subject represented on the plate, and on the coins of the Guptas, is then substantially the same; namely, a hero-king overcoming a

* A large hoard of the Indian gold coins of his nephew, the celebrated Mahomed Ghori, the first Mahomedan king of India, has lately been found in the Huzâra country. About one-fourth of the gold coins are of "*Sri-man Kumâra Pala Deva*"—the remaining three-fourths being of Mahomed Ghori. They are highly curious, as proving that the Musulman conqueror was content to have his name only represented on the coinage of the country, without changing the Brahmanical character of the coin. On the obverse is the seated figure of Durga, and on the reverse, in Deva Nagari characters, is the legend, "*Sri Mahajidina Mahamada Sâma*," for Sri Moaz-ad-din Mahummud Sâma.

lion. The Guptas besides, were contemporary with the most flourishing period of the Sassanian monarchy, from A. D. 350 to 500, and even an interchange of presents took place between them and the Sassanian kings; but which however both parties mention as tribute.

But the coincidence of subject on the coins of the Guptas and Sassanians becomes more striking, when we see that the sculptures, gems, and coins of the latter represent the lion being attacked by a hero on foot. A gem published by Ouseley in the Oriental Collections, represents the Sassanian king Balash, or Balasces, on horseback, exactly in the same way in which the kings Chandra Gupta and Kumara Gupta Mahendra are represented upon the Indian coins. But the most curious circumstance is, that we can trace this same horseman from his first appearance on the coins of the Bactrian king Mayas,* (whom I confidently hope to be able to identify with Demetrius, the son of Euthydemus,) through the coins of Azas and Azilisas, Undopherras, and Abalgasus, down to the Indo-Parthian king Arsaces; and then through the Sassanian sculptures, gems, and coins, and through the coins of the Hindoo Guptas of Kanoj, and the Pála family of Lahôr, down through the Mahomedan coinage of the Ghaznivides, and through the Pathan coinage of India, to the time of Mahmud, the cotemporary of Timur; or from B. C. 200 to A. D. 1400, for a period of 1600 years. All this I undertake to make good, when I shall publish my account of the native coinages of India.

ALEXANDER CUNNINGHAM.

Lucknow, 25th June, 1841.

* I beg to refer my readers to a paper in No. 96 of the Asiatic Society's Journal, in which the identification of Mayas with Demetrius was first maintained in opposition to the theory of Mons. Raoul-Rochette, and others. My friend Lieut. Cunningham has, I am gratified to find, adopted my views, as stated in the paper above noted; views however which he is infinitely better qualified than myself to maintain by sound historical argument.

Note by Captain HAY, on a Bird, native of the Eastern Islands, undescribed (?) in a Letter to the Editor.

Kurnaul, June 7, 1841.

MY DEAR SIR,—If the following account of an extraordinary bird met with among the Eastern Islands may prove new and interesting, you will probably insert the following in your Journal: if otherwise, destroy the communication. It is as far as I can see a new genus, but distant as I am from books, or the means of access to new discoveries, and not being in communication with Mr. Swainson, what I insert is with diffidence.

I can hardly describe the colours of this bird better than by saying, it partakes of precisely the same met with in that well-known and beautiful moth, the Bombyx Atlas, upon which insect it is supposed to feed; and it is not improbable, for their localities are the same, and it will be seen how admirably adapted for a trap is its mouth.

On first obtaining this very extraordinary bird, I commenced examining the generic distinction of "*Eurylaimus*," to which at first sight it appeared to be most likely allied. The *sombre* colours, together with its enormous bristles, seemed to point it out as a night-feeder, and sent me to hunt amongst the "*Caprimulgidæ*;" but with the assistance of Swainson's Birds, 2 vols. in the Cabinet Cyclopædia, and of Vol. x. of the Naturalist's Library, I have not been able to discover any named genus, to which this very extraordinary, and I imagine very rare, bird belongs.

I have apparently two species, if they be not male and female; the length of one however being $16\frac{1}{2}$ inches, whilst the other is not above nine; and the larger coming from Sumatra, whilst the smaller was procured from Malacca, lead me to believe them different species of the same genus.

General colour of plumage, different shades of chestnut and rufous brown, or ferruginous. Wing coverts dark chestnut, tipped with angular white spots, shaded at the edges with black: the larger wing coverts are tipped with black spots, the white edging being scarcely visible; the neck has a collar (resembling a pendent crest from the back of the head) of similarly marked feathers, though less distinct. Whole of the

belly, and beneath wing and tail, pale ferruginous ; throat and breast somewhat darker, and speckled with white : wings and tail ferruginous and barred.

Total length of bird $16\frac{1}{2}$ inches. The bill measures $2\frac{3}{4}$ inches, is wider than the head, and shaped much the same as in *Eurylaimus* ; colour of bill dark red, edged with yellow : the upper mandible overlaps the lower, and has a very sharp edge ; bill strong, but not thick in proportion to that of *Eurylaimus*. Nares so small as to be scarcely visible, and so flat that the point of a penknife cannot easily be introduced ; not basal and round as in *Eurylaimus*, but longitudinal, and covered by long bristled feathers lying along and over its extremely hooked bill ; similar feathers cover the bill to its base, and then recline ; width of bill at base $2\frac{1}{4}$ inches. The eyes are not furnished with lashes above. Wings long and rounded, the sixth quill the longest and tipped with black. Tail 6 inches. Tarsus feathered and long, ventral feathers entirely hide the feet, which are moderately strong, having the inner edge of the nails lengthened and somewhat flattened, middle toe the longest.

This is without exception one of the most extraordinary birds I have ever seen, and I do not remember it to be noticed by Dr. Horsfield. The nares being so different from the broad bills, and the supposition being, that it rests upon branches to receive and devour that immense moth, the "*Bombyx Atlas*," I would propose, should it be a new genus, naming it "*Bombycistoma* ;" or should a more experienced naturalist discover a genus already named, the specific name I would call "*Bombycivoras*." If however it is as I believe entirely new, I would name it "*Bombycistomas Fullertonii*," after the late Governor of Prince of Wales' Island, whose kindness first led me to visit the Eastern Isles, and where I first imbibed my taste for Ornithology.

In describing this bird I have before me, specimens of the genera "*Eurylaimus*," "*Cymbirynchus*," and "*Psarisomus*."

The second species which I have above mentioned, has a less brilliant plumage, and length only 9 inches. Bill $1\frac{1}{2}$ inches in width, similar to the former, but the bristles covering the nares are less prominent ; wings not so lengthened ; belly of a much lighter colour ; and the beautiful white and black spots so conspicuous on the larger bird here scarcely attract the eye.

A third bird procured by me at Malacca would appear to unite the bird first described with *Eurylaimus*; the bill in shape and form is the same, but wanting the stiff bristles; the legs are also much stronger, nails differently formed, and tarsus naked. As this is also a rare bird, I will describe it as well as I am able. Extreme length 11 inches. Bill $1\frac{1}{4}$ inches in width; culmen more arched than in the former, or than in either of the genera above named; eyes unprotected. Nares basal and round, colour bluish black, throat and upper part of breast dirty ochre. A white bar under both wings and tail. This possibly may have been described, but I think not. These Broadbills are a very interesting series of birds; the most dull in colour is that last described, and by far the most beautiful, the "*Psarisomus Dalhousiae*" of Swainson, which rare bird I have been so fortunate as to procure.

My desire is to make, what I consider a new bird known; not to claim a name, which after all may be considered inappropriate, and would then be passed over by Naturalists, "as if it never had existed."

It appears to me, that this will be the typical character of the Broadbills instead of *Eurylaimus*, in which case its name will be changed by Swainson, under whose observation I hope this bird may come.

The enclosed very rough sketch will serve to give some idea of the appearance of the head or bill, and if it prove new, it may be interesting to your Ornithological readers.



Examination of some decayed Oriental Works in the Library of the Asiatic Society. By H. PIDDINGTON, Esq. Officiating Curator, Museum Asiatic Society.

At the request of our Secretary, I have undertaken the chemical examination of the decaying Oriental MSS. Works in the Society's Library, of which the following is a description :—

It is found that, principally in the Arabic books, at the end of a certain time, a shade of black is observable about the letters. This gradually appears to increase to a cloud round each word, such as would be produced by a light shading of Indian ink. It increases to a decided brown, and eventually a black colour, when the leaves become wholly decomposed in the middle, where the black is most intense, and fall to pieces like tinder, (the writing still remaining quite visible upon them,) so that they crumble under the fingers; and in short resemble, in those parts, books which have been burnt in close vessels; reminding us of the descriptions we read of the MSS. of Herculaneum and Pompeii. In some places, where the page is surrounded with an ornamental border of red and black lines, the black line appears so completely to have destroyed the paper, that the page may be almost taken out, as if it had been cut round with a penknife. The Moulvees said it was owing to the "*kuth*," (catechu,) but the effect seemed a very unlikely one to be produced by an astringent. The disease, however, evidently arises from the ink; the paper where not written upon, being in good preservation where it has not spread from the writing.

To discover what can have produced this very serious mischief, was the problem to be solved.

1. The smell of the carbonised parts was something approaching to that of caramel; the taste sharp, saline, and acid, but not caustic.

2. A quantity of the tinder-like matter from the centre of a book, equal to about half an octavo page, was boiled in distilled water. The solution was of a dark clear red-brown colour, it reddened litmus paper very sensibly; there was therefore free acid, and no free alkali present.

3. The presence or absence of the following substances were shewn by their corresponding tests as follows :—

Presence of	{	Sulphuric acid	...	...	Acet. Barytes.
		Muriatic acid, (trace,)	...	...	Nit. Silver.
		Potass,	...	...	Mur. Platina.
		Lime, (minute quantity,)	...	...	Oxal. Ammonia.

Absence of	{	Iron,	{ Tinct. Galls.
			{ Prussiate Potass.
		Copper,	Ammonia.
		Nitric acid, . . .	Mur. Acid and Gold leaf.

4. The solution being evaporated, a portion of the carbonaceous matter became insoluble. Cold alcohol did not act on the gummy mass left, nor was any soluble salt obtained by it.

5. Acetate of barytes was added to the clear solution, and the precipitate dried at a low red heat, weighed 2.25 grs. which would give 0.75 grs. of sulphuric acid for each half, leaf or 450 grs. (by weight) for a volume of 300 pages. This is of course but an approximative calculation; but we may be fully satisfied by it, that the quantity of free sulphuric acid in the book, is quite sufficient to produce the mischief.

6. This decomposition of paper, so as to crumble to pieces between the fingers, (though without being much discoloured,) is familiar to every chemist, as happening daily to the edges of his filters with acid and alkaline solutions of but moderate strength. The discolouration may arise from the ink and iron carried by capillary attraction through the fibres of the paper with the acid, or finally, since the ink remains unaltered in most parts, from the carbonisation of the paper.

7. I suppose the excess of acid to have arisen from the use of an excess of crude sulphate of iron (*heerahosh*) in the ink, which, either ignorantly or by design,* is added in too large quantities, and thus an extra portion of sulphate of iron, in addition to the sulphuric acid set free in the composition of ordinary inks, remains in it. Sulphate of iron is a sulphate of the protoxide of iron, and the vegetable matter of the paper being particularly prone to combine with both the acid and the iron, of which last the common iron-mould spots are such familiar examples; it may easily be supposed, that in our humid climate, with its high temperature, new chemical combinations must soon take place amongst the varied principles of paper and ink-starch: gum, vegetable fibre, gallic and sulphuric acids, iron, lime, and potass; of which, as we see, the result is, that the carbonaceous matter of the paper alone remains. An analogous effect is observed by mineralogists upon labels or wrapping papers, when, by the decomposition of pyrites, sul-

* By design. There are secrets in all trades, and our Moulvee informs me, that the copyists of "*Arabisthan*" well know that their books will not last *too* long, and so spoil trade.

phate of iron is formed in specimens. The specimen upon the table is an instance where this has gone on, and at the contact of the decomposed pyrites, the label is exactly reduced to the state of our books. Another effect, perhaps of this kind, is the discolouration of the leaves of books printed upon ordinary paper, in the making of which, it is said, gypsum is used in considerable quantities to increase the weight. In this case, as gypsum has a tendency to decomposition when in contact with vegetable matter, the sulphuric acid may also be set free? The paper of these books becomes brownish, brittle, and finally crumbles to pieces, so that it is called "the dry rot."

The practical inference to be drawn from all this, for our use and that of other Societies and collectors, is, I think, this; that in copying MSS. we must prohibit the use of mineral inks—being never certain of their composition—and employ only China ink, which with a little trouble, is well adapted for fine Oriental writing. This being pure sepia or carbonaceous matter, will probably be as lasting as the best paper. I have moreover recommended, that all paper used for copying in the Library, should be well soaked in a solution of alum, which will take off the excess of starchy and gummy matter in the size, and perfectly secure it against damp; for paper so prepared is crisp in the dampest weather, and no insect will touch it. I should thus hope our MSS. will be placed in safety for a long period; but I should urge on the Society the prudence of securing copies of all the rare works, in which this discolouration has begun. There is another practical inference, which I also take leave to suggest, and it is the following: May there not be a great mass of Government records, subject to this cause of decay, through the use of ill-made ink?

Museum, 26th June, 1841.

H. PIDDINGTON.

NOTE.—This valuable memorandum was prepared by Mr. Piddington, on my shewing him a copy of the "*Murrat ool Jinan*," which had been completely destroyed by the process above remarked on. The MS. is from Egypt, and copies of it very rare. Alarmed at the destructive process to which other valuable MSS. in the Library of the Asiatic Society were subjected by similar decomposition, I at once set copyists to work to make duplicates of all which shewed signs of decay, profiting by the suggestions offered in this paper, for prevention of the injurious effects of bad ink and paper. I may add, that I have procured from Lucnow a copy of the lost MS. which is in course of transcription.

On Bos Gaurus. By W. ELLIOT, Esq. M. C. S. (from the Madras Journal of Literature and Science.)

The notice of the Bovine Genera by Mr. Hodgson of Nepal, published in No. 114, and the observations on *Bos Gaurus* by that able naturalist and by Dr. Spilsbury, which have already appeared in this Journal, may be well followed up by an extract from Mr. Walter Elliot's (Madras Civil Service) "Catalogue of the Mammalia in the southern Mahratta country," describing the animal above named, with reference to an article by Mr. Hodgson on the same subject in the 6th vol. of this Journal. One or two short notes have been appended by Mr. Hodgson to Mr. Elliot's paper, which appear with this reprint of it. By thus borrowing Mr. Elliot's excellent paper from the Madras Journal of Literature and Science, I shall have been enabled to unite with and submit to my readers all that intelligent naturalists in various parts of India have observed and recorded regarding one of the most remarkable of Indian quadrupeds "indicated distinctly," says Mr. Elliot, writing in 1840, "only within the last two years," and doubly remarkable from its apparent identity with the extinct species, fossil remains of which have been exhumed in Europe.

It may be worth while to quote a curious notice, one of the earliest, if not the earliest, by any English writer, of the *Bos Gaurus*, from the narrative of his captivity in Candy by Capt. Knox, (A. D. 1673,) who resided 19 years in the country: I met casually with it, and do not know but that it may have been quoted before. The writer is however so correct, and sagacious an observer, that I venture to incur the risk of repetition in order to supply testimony to the existence of the *Bos Gaurus* in Ceylon at the time of his confinement there.

(Knox's Historical relation of Ceylon, Chapter VI.) "Here are also wild buffaloes; also a sort of beast they call *gauvera*, so much resembling a bull, that I think it one of that kind: his back stands up with a sharp ridge; all his four feet white up half his legs. I never saw but one, which was kept among the King's creatures."



58.—*Bos (Bibos) Cavifrons*, Hodgson—Journal Asiatic Society Bengal, vol. vi. (1837) pp. 223, 499, 745.

Bos Gaurus, Griffiths.—Gour, Geoff.

Kar kona, Canarese.

Jungli khoolga, Dekhani.

Gaviya, Mahratta.

It is somewhat remarkable that one of the largest animals of the Indian Fauna, frequenting all the extensive forest tracts from Cape Co-

morin to the Himalayas, should only have been indicated distinctly, within the last two years. I have seen specimens from Tinnevely, and likewise from the whole range of the Syhadree mountains up to Mahableshwar, and I know that the animal has been killed near Vellore, in the Sherwaroyah hills near Salem, at Aseergurh, in Kandes, Rajamundry, and I doubt not that it will likewise be found in all the deeper recesses of the eastern Ghauts, and on the banks of all the great rivers passing through them. An imperfect cranium, which seems to belong to a female of this species, in the United Service Museum, is labelled thus "Head of a Bison from Kuddah, Straits of Malacca, presented by Lieutenant-Colonel Frith, Madras Artillery."

The following memoranda were made in 1833 in the southern Mahratta country, at a time when I had frequent opportunities of seeing the animal. "It is called *Gariya* by the Mahrattas, *Jungli khoodga* and *Urna* by the Mahommedans, (though it has not the slightest affinity with the buffalo, to which both of these names apply), and *Karkona* by the Canarese, which is of similar import, from *Kadu*, a forest, and *Kona*, a buffalo.

It differs also very remarkably from the common ox, and though it approaches considerably more to the descriptions of the bison, the name generally applied to it by English sportsmen, it exhibits marked structural differences, excluding it from the Bisontine group as defined by Cuvier. These consist in the plane of the fore-head being "flat and even slightly concave," and in the possession of only 13 pair of ribs. It is not improbable that it will be found to constitute a connecting link between the Bisontine* and Taurine groups. The most remarkable characters in the animal are an arched coronal, or convex bony ridge, surmounting the frontal bone, and projecting beyond it so as to make the line from the vertex to the orbit a concave sweep; the continuation of which from the orbit to the muzzle is slightly convex. The other distinctive mark is the prolongation of the spinous processes of the vertebræ of the back, from the withers to the loins where they cease abruptly. These processes are 12† in number, and their prolongation gives the animal a very extraordinary appearance.

* One prime character of skull is enormous massiveness, three times that of the Ox's skull.—B. H. H.

† 13, or same as the ribs.—B. H. H.

The largest individual I met with, was killed in an island of the Kala Nuddee in the district of Soonda, in 1827. A noted shikaree, the Potel or headman of Alloor (a Hubshee or negro descendant of some of the numerous African slaves imported in the 15th century by the Mahommedan kings of Beejapoor, and who still exist as a distinct race, in this district,) called us at day-light, and promised to shew us one of the animals described by him as a wild buffalo. Crossing the river in a canoe, we struck into the forest and soon came upon a track which he pronounced to be that of a large bull. On this he proceeded with the steadiness and sagacity of a blood-hound, though it was often imperceptible to our eyes. At times when a doubt caused us to stop, he made a cast round, and on recovering the track summoned us to proceed by a loud whistle, or by imitating the cry of the spotted deer, for not a word was spoken, and the most perfect silence was enjoined. As we advanced he pointed silently to the broken boughs or other marks of the passage of a large animal, and occasionally thrust his foot into the recent dung, judging by its warmth of the vicinity of the game. We followed his steps for three miles to the river, then along the banks towards Dandelly, where the animal appeared to have passed to the other side. Wading across, we ascended the bank of a small island covered with thick underwood, and some large trees, amongst which it had lain down, about fifteen yards from where we stood. The jungle was so thick that we found it difficult to distinguish more than a great black mass among the underwood. On firing the animal got on his legs, received two balls more, and rushed into the jungle where he became very furious, and we were obliged to shelter ourselves behind the trees, to avoid the repeated charges he made, though one ball through the shoulder which had broken the bone above the elbow, prevented his moving with facility. He then became exhausted and lay down, snorting loudly and rising to charge when any one approached. A ball in the forehead caused him to roll over the precipitous bank into the river. Still however he was not dead, and several balls were fired into his forehead behind his ear and the junction of the head and neck without life becoming extinct; one ball which had struck the vertebræ of the neck was taken out almost pulverized.

When drawn ashore and examined more minutely, the first sentiment produced in all present, was astonishment at his immense bulk and

size; but on measuring his height we found him much taller than his breadth at first led us to imagine.

The head is very square, and shorter than in the common ox, the forehead ample, the bony ridge rising about five inches in height from the plane of the frontal bone over which it inclines. When viewed behind it rises suddenly and abruptly from the nape of the neck, from whence to the vertex it measures seven inches, the horns make a wide sweep, in continuation of the arched bony ridge, and turn slightly backwards and upwards, forming an angle of about 35° with the frontal bone, the whole of the head in front, above the eyes, is covered with a coat of close short hair of a light greyish brown colour which below the eyes is darker, approaching almost to black. The *muzzle is large and full*,* of a greyish colour, the eyes are smaller than in the ox, with a fuller pupil of a pale blue colour, the ears are smaller in proportion than in the ox, the tongue is very rough and covered with prickles, the neck is short, thick, and heavy, the chest broad, the shoulder very deep and muscular, the forelegs short, the joints very short and strong, the arm exceedingly large and muscular. Behind the neck and immediately above the shoulder rises a *fleshy gibbosity* (?) or hump, the same height as the dorsal ridge, which is thinner and firmer, *rising gradually* as it goes *backwards*,† and terminates suddenly about the middle of the back. The hind quarters are lighter and lower than the fore, falling suddenly from the termination of the ridge, the tail very short, the tuft only reaching down to the hocks.

The dimensions of this individual were carefully noted as follows:—

	feet inches.	
Height at the shoulder.....	6	$1\frac{1}{2}$
Do. at the rump (taken from hoof to insertion of tail).	5	5
Length from the nose to the insertion of the tail.	9	$6\frac{1}{2}$
Do. do. to the end of the tail which was 2 ft. 10 in.	12	$4\frac{1}{2}$
Do. of dorsal ridge including the hump.	3	4
Height of do. do.	0	$4\frac{1}{2}$
Girth (taken behind the forelegs)	8	0
Breadth of the forehead	1	$3\frac{1}{2}$

* Less than in *Bos* or *Bubalus*.—B. H. H.

† Quere forwards? The height of the true dorsal ridge declines from the third process of the vertebræ, and the general appearance of the ridge therefore is a declination, not a rise, towards the croup from the withers.—B. H. H.

From the muzzle to the top of the arched bony ridge ...	2	$1\frac{3}{4}$
Distance between the points of the horns	2	1
Circumference of horn at base	1	$7\frac{1}{2}$
Between the roots of horns.....	0	$13\frac{1}{2}$
Length of the ear	0	$10\frac{1}{2}$
Circumference of the neck	4	4
Depth of the shoulder (from the elbow to the end of the spinal ridge) ..	1	$2\frac{1}{2}$
From the elbow to the knee (i. e. the fore-arm) ..	4	$5\frac{3}{4}$
From the elbow to the heel	2	7
Circumference of the arm	2	6

The skin on the neck and shoulders and on the thighs is very thick, being about two inches in this one, which has already shrunk from lying in the sun. It is used for making shields, which are much prized. On examining the skeleton picked clean by the vultures, we could only distinguish thirteen pair of ribs.

The cows differ from the male in having a slighter and more graceful head, slender neck, no hump, a less defined dew-lap, and the points of the horns do not turn towards each other at the points, but bend slightly backwards; the horns are smaller too, and the frontal bone narrower, but the coronal or ridge is distinctly marked. The bulls have the forehead broader in proportion to their age. In the young bull it is narrower than in the cow, and the bony ridge scarcely perceptible. The horns too in the young specimen turn more upwards.

The general colour is dark brown, the hair thick and short, but in old individuals the upper parts are often rather bare. That on the neck and breast and beneath is longer, the skin of the throat is somewhat loose, giving the appearance of a slight dew-lap. The legs are white, with a rufous tint on the back and side of the forelegs. The skin of the under parts when uncovered, is a deep ochry yellow. The cow has the legs of a purer white.

The breeding season is said to be early in the year, and the calves are born after the rains. The bulls are often found separate from the herd, which consists generally of from ten to fifteen cows and a bull. They generally feed during the night, browsing on the young grass and the tender shoots of the bamboos, of which they are very fond. In the

morning they retire to some thicket of long grass, or young bamboos, where they lie down to ruminate. When disturbed the first that perceives the intruder stamps loudly with its foot to alarm the rest, and the whole rush through the forest, breaking down every obstacle, and forcing their way with a terrific crash,

——— dat euntibus ingens
Silva locum, et magno cedunt virgulta fragore.

Æn. vii. 676.

When suddenly approached in the night, they start off with a loud hissing snort.

In 1831, I saw a young Bison calf in the possession of some Gowlees, the owners of large herds of buffaloes in the Hangul talook. It was caught when just dropt, in the month of May, and when I saw it, was seven months old, very tame and gentle, though timid, licking the hands of the Gowlees, and frisking about with the buffalo calves. It was the same colour as the old animal, very dark brown with white legs. The head small, the forehead wanting the breadth so remarkable in the adult, and the bony ridge of the crown was hardly perceptible. The horns were just beginning to sprout, the ears larger and rounder than those of the buffalo, the eyes a pale grey or cerulean colour. The hair on the throat was long, and the dew-lap slightly indicated. No hump was perceptible, but the dorsal ridge was distinctly marked.

The Gowlees say, they see great numbers of Bison when pasturing their herds in the neighbouring forest. They describe them as very timid and watchful, more so than any other wild animal, always reposing in a circle with their heads turned outside, ready to take alarm. They add, that they see most calves from June to October, but the greatest number about August. They do not know how long the cow goes with calf, but suppose the period of gestation to be the same as that of the buffalo, or ten months and ten days. The old male drives the others from the herd at the breeding season, and the single ones seen in the jungle are young males of this description, and it is probable the very old bulls are sometimes expelled also by younger and stronger males."

For the following particulars derived from the observation of the animal in the Shervaroyah hills, I am indebted to Mr. Fischer, of Salem: "The Bison ordinarily frequents the hills, seeking the highest and coolest parts, but during the hottest weather, and when the hills are parched

by the heat, or the grass consumed by fire, the single families, in which they commonly range the hills, congregate into large herds, and strike deep into the great woods and valleys; but after the first showers, and when verdure begins to re-appear, they again disperse, and range about freely. In wet and windy weather, they again resort to the valleys, to escape its inclemency, and also to avoid a species of fly or gnat, which harasses them greatly. In the months of July and August, they regularly descend to the plains, for the purpose of licking the earth impregnated with natron or soda, which seems as essential to their well-doing, as common salt is to the domestic animal when kept in hilly tracts.

The chief food of the Bison seems to be the following grasses and plants:—

Yadanjān cody

Vallaum pilloo *A species of Sacharum, used for thatch.*

Odeserengan pilloo

The cottay woottoo leaf *Ricinus Communis, Castor oil Plant.*

Mullum pilloo *Anthystiria polystachia, Roxb.*

Canavum pilloo *Sorghum muticum. Wild Cholum.*

Cheevum pilloo *Broom grass. (Aristida).*

Cattoo Corangan leaf *A species of Convolvulus. Ipomæa*
Staphylina?

but they will eat with avidity every species of grain commonly cultivated on the hills or plains, as the ryots find to their cost. The Bison particularly is so fond of the *avaray cottay* (*Dolichos Lablab*, Ainslie),* when in blossom, that they will invade, and destroy fields of it, in open daylight, in despite of any resistance the villagers can offer. In other respects it is a very inoffensive animal, very rarely attacking any one it encounters, except in the case of a single bull driven from the herd. Such a one has occasionally been known to take up his location in some deep bowery jungle, and deliberately quarter himself on the cultivation of the adjacent villages. The villagers though ready to assist Europeans in the slaughter of Bison, will not themselves destroy them (the inviolability of the cow extending to the Bison); and so bold does this freebooting animal become in consequence, that he has been known to drive the ryots from the fields, and deliberately devour the

* Country bean.

produce. But in general it is a timid animal, and it is often difficult to get within gun-shot of them.

The period of gestation is with the Bison the same as with the domesticated animal; they drop their young in the months of September and October. I once had one brought to me so young, the navel string was still unseparated. I should think it was then about the size of a common country cow's calf of four months old. It seems a slow growing animal. A calf I had for three years was evidently in every respect still a mere calf. They seem very difficult to rear. I have known it attempted at different ages, but never knew the animal to live beyond the third year. Mr. Cockburn has tried it in vain, in its native climate, the Sherwaroyah hills, and I have made the attempt at Salem repeatedly. At one time I had five in my farm-yard; one lived for three years: but this one, with all the others, died suddenly in the same week from some disease, marked by refusal of food, running from the nose, and an abominable stench from the mouth. A similar disease, it may be noted, prevailed, I was informed, at the same time, among the Bison of the Sherwaroyah, Shandamungalum and Neilgherry hills. The calves I had, never became in any degree domesticated: the domesticated cow could never be induced to suckle them."

I may add, that the persevering ferocity of the Bison of the Sub-Himalayan range, described by Mr. Hodgson, is quite foreign to the character of the animal in the southern forests. When wounded, it is true, it charges its assailant with determined courage, and many instances have come to my knowledge of its doing so with fatal effect, among which I may cite those of two officers within the last few years, both of whom were killed at the Mahabaleshwar hills; but in general it will always seek its safety by flight, if permitted.

	inches.
Height from the end of the maxillary bone to the vertex...	22
Breadth of front between the edges of the horns.....	13 to 14
Length of horn from base to point in a straight line	21
Do. do. along the curve ..	30
Diameter (longest section) inside	6½
Do. (broadest do.).....	4¾
Circumference at the base.....	18½
Distance between the points.....	39

Proceedings of a Special Meeting held at the Asiatic Society's Rooms.
(Friday, 14th May, 1841.)

The Hon'ble W. W. Bird, Esq. in the Chair.

Read the following letters ; viz.

From Mr. A. Csoma de Korosi of the 1st May 1841, tendering to resign the office of Librarian to the Asiatic Society of Bengal, and requesting permission to occupy his present quarters in the Asiatic Society's premises till the period of his departure from Calcutta. Also offering for the acceptance of the Society "the half of his salary" received by him during the three years of his employment as the Society's Librarian.

From Mr. Secretary Bushby, No. 309, dated the 7th April 1841, communicating copy of a letter from the Hon'ble the Court of Directors, advising that they had sanctioned the payment of an advance of £150 to Mr. E. Blythe, selected by Professor Wilson as Curator of the Museum of the Society, for his outfit and passage, and requesting information as to the mode most agreeable to the Society to refund the advance made to Mr. Blythe by the Court.

On the foregoing, it was resolved—

That the Committee recommend that the resignation of Mr. Csoma de Korosi be accepted, with the expression of the acknowledgments of the Society ;—That the Society do not accept the refund of the half salary for three years ;—That the Society with reference to the continued connection with Mr. C. de Korosi accede to placing him on the same footing as he was before he became Librarian, and permit him to remain in the rooms he now occupies till his departure.

That the Committee recommend the Society to employ a Librarian on 100 Rupees per mensem, and suggest that candidates be invited to submit their application,—the Secretary in the mean time, taking on himself the charge of the Library.

That the invitation be conceived in the following terms:—"The Society beg to state that no candidate need apply who is not a man of education and of literary habits, more or less acquainted with Oriental languages, and who is not prepared to attend in the Library for not less than four hours a day."

The question of re-payment of the advance to Mr. Blythe for outfit made by the Court of Directors being laid before the Committee, it was resolved—That the subject be left in abeyance till his arrival.

With reference to the foregoing Resolutions, the following letters to Mr. Csoma de Korosi and to Mr. Secretary Bushby were addressed, and a "Notice" published in the daily papers under this date.

'To Mr. A. CSOMA DE KOROSI,'

Librarian.

'SIR,—Having submitted to the Committee of Papers of the Asiatic Society your letter dated the 1st instant, tendering your resignation as its Librarian, with

liberty to retain your present quarters till the period of your departure from Calcutta, as also the offer of half the salary received by you during the three years of your employment, I am desirous to state that, although the Society accepts your resignation, with the expression of its acknowledgments for your valuable services, yet it cannot accept your offer of the refund of "the half salary for three years;" but your motives for making it are duly appreciated.

2. With reference to the continued connection with yourself and the Society, the Committee of Papers accedes to placing you on the same footing as you were before you became Librarian, *i. e.* to receive an allowance from the Society of Rupees 50 per month, with permission to retain, till your departure from Calcutta, the rooms now occupied by you.

3. The foregoing arrangements to have effect from the 15th instant.

I am &c.

(Signed) H. TORRENS,
Secretary Asiatic Society.

' To G. A. BUSHBY, Esq.

' Secretary to the Government of India.

' Gen. Dept.

' SIR,—I have the honor to acknowledge the receipt of your letter, No. 309, dated the 7th ultimo with its enclosure, and in reply to state for the information of the Right Hon'ble the Governor General of India in Council, that the Asiatic Society would prefer that the consideration by them of the suggestion of the mode of re-funding the advance of £150, for outfit and passage made to Mr. E. Blythe, who has been selected as the Curator of the Society by the Hon'ble the Court of Directors, be left in abeyance till the arrival of that individual.

I have, &c.

(Signed) H. TORRENS,
Secretary Asiatic Society.

NOTICE.

Wanted, a Librarian for the Asiatic Society of Bengal, at a Salary of Rs. 100 per month. No candidate need apply who is not a man of education and of literary habits, more or less acquainted with Oriental languages, and who is not prepared to attend in the Library for not less than four hours a day.

Applications to be submitted addressed to H. Torrens, Secretary Asiatic Society.

Proceedings of the Asiatic Society.

(Wednesday Evening, 7th July, 1841.)

Dr. J. J. HEBERLIN, Senior Member present, in the Chair.

Mr. S. G. T. HEATLY proposed at the Meeting of the 2d June last, was ballotted for and duly elected.

Ordered, that the usual communication of his election be made to Mr. HEATLY, and that he be furnished with a copy of the rules of the Society for his guidance.

Library and Museum.

Books received for the Library of the Asiatic Society, for the Meeting of the 7th July, 1841.

Mantell's Wonders of Geology, London, 1838, 8vo. 2 vols.

The Calcutta Christian Observer, for June and July 1841, New Series, vol. 2d, Nos. 18 and 19.

Lardner's Cabinet Cyclopædia—Swainson and Shuckard's History and Natural arrangement of Insects.

Transactions of the Linnean Society, vol. 16th, part 1st, vol. 17th, part 1, 2, 3, and vol. 12, parts 1, 2, 3, 7 vols.

Calcutta Monthly Journal, &c. for May 1841, 1 vol.

Yarrell's History of British Birds, part 23d.

Annals and Magazine of Natural History, No. 41, March 1841.

Oriental Christian Spectator, Second Series for March, April, and May 1841, Nos. 3, 4, 5, Bombay.

Maha-Nataka, a Dramatic History of King Rama, by Hanumat, translated by Kali Krishna Bahadur, Calcutta, 1840, 1 vol.

Genealogical and other accounts of Maha-Raja Kali Krishna Bahadur, Calcutta, 1841.

Proceedings of the American Philosophical Society, vol. 1st, Nos. 12 and 13 for 1840.

Proceedings of the Linnean Society of London.

Catalogue des Livres composant la Bibliothèque de feu M. Klaproth, Paris, 1839, 1 vol.

Read the following report from Dr. E. ROER, appointed Librarian to the Asiatic Society of Bengal in the room of Mr. CSOMO DE KOROSI, resigned.

H. TORRENS, Esq.

Secretary, Asiatic Society.

Sir,—I have the honor to submit to you the following report:—

Having taken charge of the Library on Monday the 21st of June, I thought it my duty to ascertain the number of the European Books; the number not being specified in the Manuscript Catalogue, and I found it to be the following:—

English Books,	...	...	...	...	2,292
Ditto Pamphlets,	...	...	...	...	211—2,503
French Books,	...	...	...	...	1,140
Ditto Pamphlets,	...	...	...	...	209—1,349
Latin Books,	...	...	...	...	537
Ditto Pamphlets,	...	...	...	...	27—564
Miscellaneous Books,	...	...	...	...	331
Ditto Pamphlets,	...	...	...	...	39—370
Books lent out,	...	...	...	...	205
Ditto Pamphlets ditto,	...	...	...	...	14—219—5005

It is highly satisfactory to me, as it will no doubt be to the Committee, to know that most of the Books belonging to the Society are in good condition. I am, however, sorry to say, that some of the Manuscripts of the Sanscrit and Persian Library are in a state which threatens irreparable loss, if not immediately transcribed.

Of these I forward a list.

The key of the Medal Cabinet having been delivered to me by MR. PIDDINGTON, I counted the medals in the presence of MR. DE KOROS and MR. BOUCHEZ, and found their number exactly corresponding to that stated in the list, excepting two impressions which were not mentioned in it.

My attention has been directed to the arrangement of the Books and of the Catalogue, and I avail myself of the present opportunity to make a few remarks.

The arrangement of the books is made, I perceive, according to the languages in which they are written, and in each division they are placed according to their size; the same plan is adopted in the Catalogue, with the exception, that the Books instead of being placed according to their size, are arranged after the alphabetical order.

I need not stay to inquire how this arrangement is at variance with a proper classification, as I think this is clearly apparent, I shall merely offer a few remarks concerning it.

As the proper and principal design of the arrangement of a Library is to promote the most extensive and the most beneficial use of the books, no classification which does not approach as near as possible to the natural division of literature in general, can be satisfactory.

An arrangement opposite to the classification of sciences, isolates the use of the books, while a Library, arranged as strictly as possible according to the subjects, suggests at once all that is, and all that is not contained in the collection relating to the different branches of science, and at the same time invites and introduces the inquiring mind into the outer halls of science.

All the large libraries which I have seen are arranged according to this plan, for instance those of Berlin, Goettingen, and Wolfenbuttel.

It is desirable, that this principle should be followed in the arrangement of every library; yet it must be allowed, that it can strictly be adhered to only in large collections which contain the leading works of every branch of learning; it must, however, be borne in mind, that an arrangement according to a well-concerted plan, though not followed out in the minor niceties, is infinitely preferable to an arrangement, based upon a contrary principle.

For a Catalogue there is not, however, the same necessity for such an arrangement. A Catalogue has to state only what books are in a library, and to point them out, so as to be easily and immediately found; the alphabetical order seems to be a sufficient provision.

This arrangement is adopted in the Catalogues of many libraries. There is, however, another purpose in the framing of a Catalogue which should not be forgotten, and that is to inform the man of reading and science, what advantages he may derive from consulting the library. It can scarcely be expected, that such information can be obtained by an alphabetical order. To peruse a Catalogue of a large library to ascertain what works it contains, relating to particular branches of learning, is a waste of time to which few people will submit, and consequently a library may contain many excellent works which have escaped the notice even of literary men, and the Catalogue therefore fails in accomplishing the most important purposes for which it was made.

If the foregoing remarks be correct, a new arrangement of the Library and Catalogue is desirable.

The number of books being 5,000 and upwards, is, I think, sufficiently large to sanction such an arrangement, and as a new Catalogue is now about to be printed, this is perhaps the most favorable time to make it, should the Committee deem it necessary.

Under this impression, I have directed my attention to a proper arrangement of the Library and Catalogue, which might afford the members of the Society the greatest facility in using the books.

I have now the honor to lay the arrangement which I think it desirable to make before the Committee; but I would, however, beg to say the arrangement is based on a Classification of the

subjects, only as far as the deficiencies of the Library will admit, and will afford, if not all, most of the advantages of the above plan.

A.	B.	C.
Classical Literature.	Oriental Literature.	European (modern) Literature.
	A Classic Literature.	
I. Philosophy.	II. History, &c.	III. General Literature.
	Thus also the Oriental Literature.	
	C.	
	European (modern) Literature.	
I.—Theology,		
II.—Jurisprudence,		
III.—Medicine,		
IV.—Philosophy,		
V.—Mathematics,		
VI.—Natural Sciences,		
VII.—History (including Diplomacy, Numismatology, Biography, Memoirs, &c.)		
VIII.—Geography, Topography, Statistics, &c.		
IX.—Travels and Voyages,		
X.—General Literature,		
XI.—Linguistics, (Dictionaries, Grammars, &c.)		
XII.—Proceedings, Records, &c. of Societies, Journals, &c.		
XIII.—Encyclopædia Works.		
XIV.—Maps.		

I have not stated the sub-divisions in the arrangement of the Library, as they must depend upon the number of works in each division.

In the Catalogue each division will be arranged alphabetically, according to the titles; but no sub-divisions will be made; still however, it will be desirable to annex an alphabetical Index of the names of the authors, with reference to the page of the Catalogue in which their works are to be found.

In concluding this Report, I would remark, that I have already completed in Manuscript, the Classical and Oriental sections, and the division of History also in the third section.

Should the Committee approve of the arrangement I recommend, I shall endeavour to complete it as soon as possible.

I have the honor to be, Sir,

Your obedient servant,

E. ROER.

July 1841.

Ordered that the Report be referred to the Committee of Papers for consideration, as regards the adoption of the plan of arrangement and classification of the Books recommended by Dr. ROER.

Read the following Report of the Officiating Curator for the month of June last :—

H. TORRENS, Esq.

Secretary Asiatic Society.

Sir,—For the month of June I have the honor to report as follows :—

“*Geological, Paleontological and Mineralogical Departments.*—Our catalogues and arrangements are continuing. In the Geological department we have obtained a very interesting addition to our collections. In my report to Government on the soils brought from China by Captain HALSTED, and sent to the Museum of Economic Geology, I pointed out that it was matter of much regret that no *rocks* accompanied the soils, from a place where so many curious phenomena had evidently taken place, and were yet going on. The Right Honorable the Governor General has been pleased to interest himself in this matter, and to request Captain HALSTED to favour us with any specimen of the rocks which he might possess, and the result is the very curious series now on

the table; being basaltic hornblende from the central peak, calcareous sandstones and concretions from the raised coasts and adjacent islands, with one or two specimens of indurated clays, and a specimen of what I should almost venture to term a lias limestone! found in boulders about the mouths of the volcanoes. When to this we add the fact that of sixteen specimens of the soils of the island, only two are in any degree calcareous, and these probably from the admixture of shells, we have evidence that the volcanoes have formed the soils by eruptions of mud, either before or since the upheavement of the island, since from the absence of the calcareous matter the soils cannot have been formed like the coast rocks. It would moreover appear, that the eruptions have been from different strata, amongst which one much resembles the lias, so great a novelty in Indian Geology; but which according to FRANKLIN, is found in the basaltic district of Bundelcund, in the direct line between the mud volcanoes of Cheduba and those of Sommeancee.

Osteological.—We are beginning to mount the skeleton of the Neelghye.

Ornithological and Mammalogical.—Nothing new to report.

Conchological.—Captain HALSTED has obliged us by a small collection of shells from Cheduba and the neighbouring islands, of which some will be additions to our cabinet.

Botanical.—We have also in this department to announce an addition to the development of our knowledge of Indian Natural History. My report for the month of May, and the Paper on the Society's Himalaya Lichens, published in the Journal, anticipated the probability, that we should discover valuable ones in our vast extent of territory; and I have now the pleasure to announce, that one of our own specimens No. 17, which at first gave a brilliant crimson, has now changed to a rich purple, shewing that it is of considerable value as a dying Lichen. The bottle containing the liquid has been placed at the disposal of the Right Honorable the Governor General for transmission to England; and we shall endeavour to procure such a supply of the Lichen, as may enable proper experiments to be made.

Museum of Economic Geology.—DR. ANGUS has been kind enough to procure for us from DR. HUNTER of Futtyghur, specimens of the green glass bottles, and of the mixture used for manufacturing them there, as also of the clay from which the fire bricks are made.

He has also been good enough to promise us larger specimens of the materials from which the frit of the glass bottles is made, the scum and the melted material, we shall then possess in a second instance, (MR. W. PRINSEP's contribution from the iron mines of Burdwan being the first) specimens of a complete Indian mineral manufacture, from the raw material up to the finished production for the use of man.

Additions to the Museum have been as above stated.

Captain Halsted, H. M. S. Childers.—Geological specimens from Cheduba.

A collection of Shells, principally from Cheduba.

Dr. Hunter from Futtyghur through Dr. Angus.—Three green glass bottles from the Futtyghur manufacture, with sample of the mixture from which they are made.

Specimen of the earth from which the Futtyghur fire bricks are made.

H. PIDDINGTON,

Acting Curator, Museum Asiatic Society.

7th July, 1841.

Read letter No. 685, dated 18th June last, from the Secretary to the Government North West Provinces, forwarding Lieut. R. B. SMITH's communication, submitting outline of a project for the elucidation of the Economic Geology of the North West Provinces.

Read also a letter from Lieut. R. B. SMITH, of the 12th June last, received simultaneously with the foregoing, intimating the submission of his project.

Ordered, that the papers be referred to the Committee of Papers for consideration: meanwhile Lieut. SMITH be addressed to send the Tabular Forms prepared by him, said to embrace all points essential to the formation of an estimate of the Economic value of the materials specified and referred to in his letter to Mr. Secretary THOMASON, of 3d June 1841, paragraph 4.

Read a report from the Officiating Curator, of the 1st April 1841, on the Cabinet of Coins belonging to the Asiatic Society.

Read also a letter from Mr. CSOMA DE KOROSI, of 31st March 1841, with a list on the same subject.

Ordered that the papers be referred to a Committee specially selected, for investigation and report upon the subject, with a view to the adoption of measures for preventing the cause of complaint connected with this particular branch of the Society's Museum; and in pursuance of the foregoing resolution, the Officiating Curator, Messrs. HUFFNAGLE and STIRLING, and Dr. HABERLIN were selected to form a Committee for the purpose.

Read a letter from Capt. Geo. TWENLOW, Bengal Artillery, of 18th June 1841, forwarding specimens of black shining ore-like particles, which form on the ground of the table land near the fortress of Gawilghur near Ellichpore after rain, wherever water has run, the ground being of reddish soil, formed apparently from Basalt under decomposition. On inspection of the specimens, they were pronounced by the Officiating Curator to be the common granular Magnetic Iron Ore.

Ordered, that Capt. TWENLOW be informed accordingly.

Read a letter from Capt. W. E. HAY, of the 7th June 1841, descriptive of an extraordinary Bird he met with among the Eastern Islands.

Read a letter from Lieut. A. CUNNINGHAM, of the 25th June last, on the Inscriptions from the Girnar Rock.

Read a letter from Capt. JACOB, of 15th June 1841, forwarding a Transcript in Nagree characters of the Ancient Inscriptions on the Girnar Rock near Joonaghur, in Kattywar, comprising the Eastern portion of the Rock.

Read also two letters from Lieut. POSTANS, on the products of Khorassan.

The Secretary informed the Meeting, that the subjects treated of in the foregoing papers, would be published in early numbers of the Asiatic Journal.

Read a letter from Mons. E. BURNOUR, of 12th April 1841, acknowledging Moorcroft's Travels, and regretting the interruptions of intercourse between the two Societies, &c.

Read also a letter from the Secretary Linnean Society, London, 10th November 1840, forwarding 3 vols. of the Transactions of the Linnean Society, and noticing the irregularity with which the Asiatic Researches have been received by the Linnean Society, with Memo. of what portions of the publication have been received.

Ordered, that the publications required as presentations be forwarded, and occasion taken to improve the connections of the Society with scientific bodies in England, and on the Continent of Europe.

As connected with the subject, the question for printing the Transactions of the Society was discussed, the printing of which had been neglected for several years from the want of subjects, the magnitude of the expence of printing, &c. In removal of the first objection, the Secretary proposed to place at the disposal of the Committee of Papers such papers as were received by him from

contributors to the Journal for consideration, whether they should be omitted in the Journal to be printed in the Transactions.

Referred to the Committee of Papers for consideration and report.

Read letter from Moulvie ABDULLAH, of 11th June 1841, soliciting the patronage of the Asiatic Society by subscription of his undertaking in reprinting the three volumes of the *Futwa Alungeri*, a work of great merit and of extensive use in Mahomedan Law.

Also referred to the Committee of Papers for consideration and report.

Read a note drawn up by the officiating Curator, on the examination of some decayed Oriental works in the Library of the Asiatic Society.

A carved Slab, dug up at Gurgoon, was presented by the Assam Tea Company. In forwarding it, the Secretary, Mr. Hampton, writes: "By desire of the Directors of the Assam Company, I have the pleasure to forward for the acceptance of the Asiatic Society, the accompanying carved Stone, received recently from Assam."

Read letter from Rajah KALLEEKRISHNA Bahadoor, of 23rd June 1841, forwarding for the acceptance of the Society, a copy of his English version of Maha-Nataka, a dramatic Hindu work, originally written in Sanscrit, together with the original, and a short account of himself.

Read letter from Mr. Secretary MADDOCK, of the 28th June last, regarding the furnishing of certain instruments required for the Magnetic and Meteorological Observatory, proposed to be established at Lucknow.

Referred to the Officiating Curator for report.

An iron Bar of exact linear measurement for surveying purposes, constructed by the late Mr. James PRINSEP, presented by his brother and executor W. PRINSEP, Esq. was submitted for the inspection of the Meeting.

For all these presentations and contributions, the thanks of the Society were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

*Scheme of a Table for all Time. By Capt. R. SHORTEDE, Assistant
Surveyor General.*

I enclose for publication, if you approve, in your Journal, a Perpetual Time Table, which I constructed sometime ago; by the help of which may be found in less than half a minute, the week-day of any date for thousands of years, past or future.

Besides the directions given on the back, little more seems necessary to render intelligible the method of using it. The Table consists of three concentric circular cards, each having seven divisions corresponding to the days of the week. On the outer are written, from left to right, on three circles, the odd years of a century. On the second card are written the full centuries, of New Style on the outer, and of Old Style on the middle circle; the order of these being from right to left. Within are the days of the week from left to right. The third card has the days of the month from left to right, and within these, the twelve months in a peculiar order, each following month being as many divisions to the left as the days in the preceding month exceed 28.

In using the Table, the first thing is to adjust the second card with its proper century to the zero on the outer card; thus for 1841 New Style, the full century being 18, the division containing the N. S. 18 on the second card, is to be brought opposite that division on the outer card which contains the double zero (00). This being done, the middle card will require no change till the year 1900, when the centurial division containing 19 (N. S.) is to be brought opposite the (00) division.

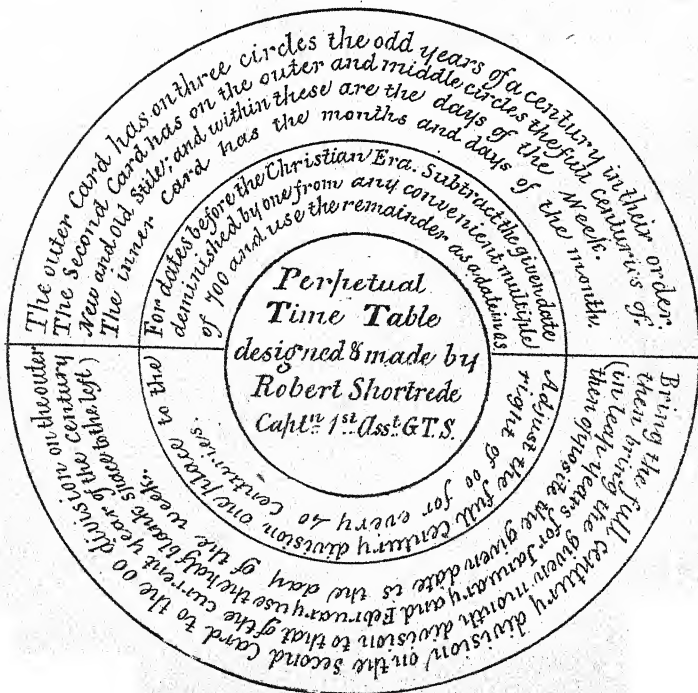
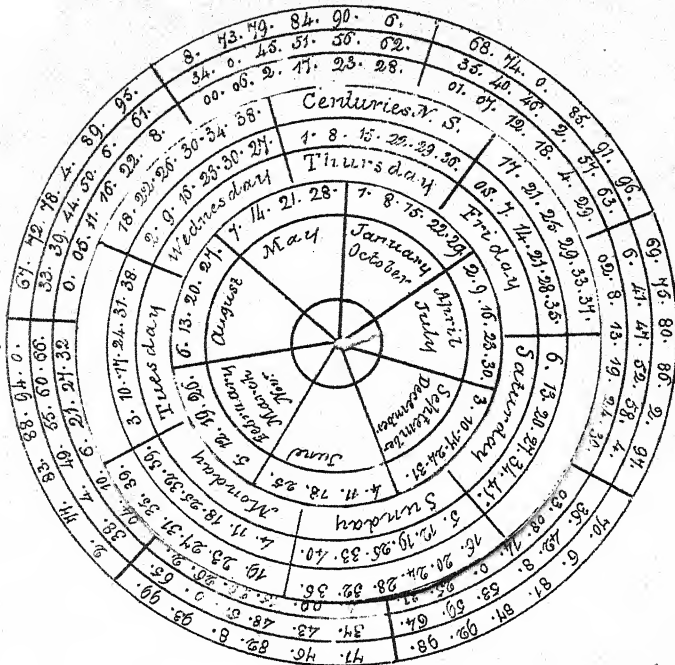
The odd year 41 of the century being found on the outer card, the division containing it is that by which the months are to be adjusted throughout the year: the division containing the given month being brought opposite that of the 41, the days of the month will be opposite their proper week-days. For example, to find the week-days of the 8th and 18th of June—*June* being brought opposite the 41, opposite the 8th will stand Tuesday, and opposite the 18th stands Friday. In like manner *December* being brought opposite the 41, opposite the 23rd stands Thursday. For the 18th June 1815, the centurial adjustment remaining unchanged, June being brought opposite the year 15 on the outer card, the 18th is seen opposite Sunday. The battle of Preston happened on the 21st September 1745, Old Style, required the week-day. The Old Style century 17th being brought to the 00, and September to the year 45, opposite the 21st stands Saturday.

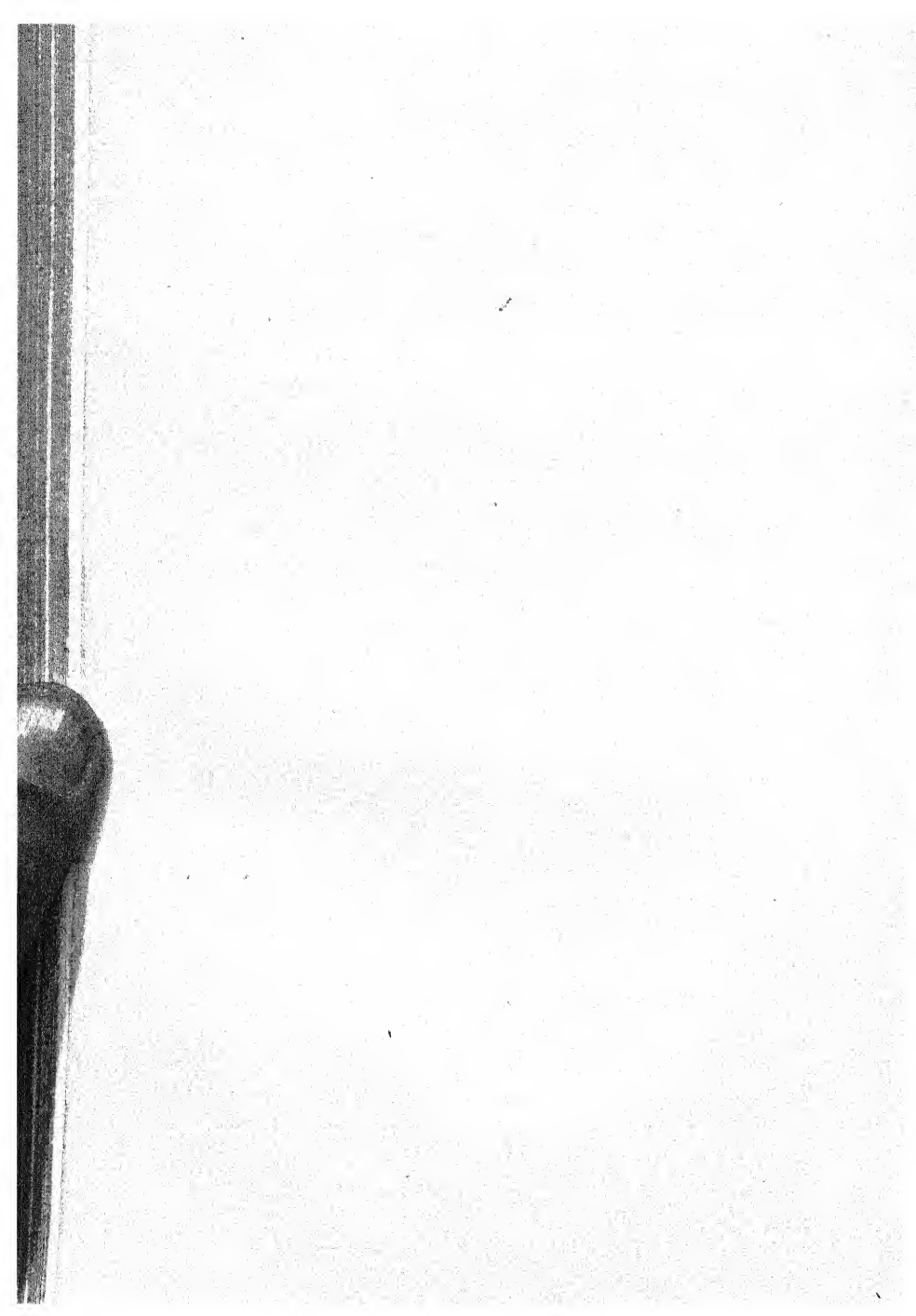
The battle of Culloden was fought on the 16th April 1746, O. S. required the week-day. The centurial adjustment remaining as before, April being brought opposite the year 46, opposite the 16th stands Wednesday.

Thus the Table is used with equal facility for N. S. or O. S. dates.

The second card having the full centuries of both styles, (which may be continued at pleasure), shews at once those which have the same week-days. The O. S. centuries are continued by successive additions of 7, and those of N. S. by additions of 4. The reason of which is, that a Julian or O. S. century having 25 leap years, consists of 5200 weeks and 125 days. Now 125 days are short of 18 weeks by one day, hence each Julian century commences on a week-day earlier by one than did the preceding century; so that the same week-days must recur after a period of seven centuries. But in the New Style there are three Gregorian centuries and one Julian; and as a Gregorian century has only 24 leap years, it consists of 5200 weeks and 124 days, being two days short of 18 weeks. The loss of two days on each of the three Gregorian, and one day on the Julian century, amounts to a week every 400 years, and hence the recurrence of the same week-days in the order above mentioned.

When Pope Gregory XIII. in 1582 introduced the New Style, the object was to adjust the festivals in the Calendar to the same time of the year as they held at the time of the Council of Nice in 325; ten





days were added to the reckoning by counting the 14th instead of the 4th of October, as it was estimated that so much had been lost during the interval. It would, however, have been correct had only 9 days been added, because from 325 to 1582 there are 1257 years, during which 3 days having been lost every 4 centuries, it is clear that 9 days must have been lost in 1200 years, and the reckoning of the odd 57 years being the same according to both styles.

By adding ten days to the Calendar, the festivals have in fact been adjusted to what they were in the century before the Council of Nice.

This mistake may be shewn by the Table, where it is seen that the same week-day is common to the full century 30 according to both styles, and as the coincidences occur at intervals of 28 centuries, the same week-day is common to both styles in the full century 2, whereas the week-days of the full century 3 differ in Old and New Style. The agreement would be perfect in the year 225, but wrong by a day in the year 325.

This mistake in adjusting the New and Old Styles, is similar to that committed in settling the Epoch of the Christian Era, the true time, as is now generally admitted, being 4 years before the common reckoning.*

As it is often convenient to reckon dates before the Christian Era in Julian years, I have given a rule for finding the week-days of such dates with facility, by observing that they recur in the same order every 700 years. The rule is this: subtract the given year diminished by one from any convenient multiple of 700, and use the remainder as if it were a common Old Style date.

As the Gregorian adjustment of the Calendar causes an error in excess of about one day in every 40 centuries, this may be allowed for by adjusting the full century-division not to the 00, but one division to the right of it for every 40 centuries. This adjustment renders the Calendar perpetual, so far as depends upon our present knowledge of the length of the year; but the adoption of this, or the correction of any error which may be found to be involved in it, will remain for future generations.

22nd March, 1841.

P.S.—The proper method of manipulating the Perpetual Time Tables, is the following:—In adjusting the full century to the zero, put the two

* See Barlow's *Mathematical Dictionary*, art. Epoch; or the Essay in Fergusson's *Astronomy*.

first fingers of each hand to the back of the card, (the zero being toward the front,) then with the thumbs move about the second card to the required position.

In making the monthly adjustment, hold the outer card between the fore-finger and thumb, the division containing the odd year of the century being to the front, then putting the thumb of the other hand over the centre on the face and the forefinger at the back, turn about the central card till the proper month division comes opposite that of the odd year.

Notes on Capt. SHORTEDE's Scheme. By W. MASTERS, Esq.

1. Let the 1st of January begin with any day of the week A, and write down in succession all the months, with their days under corresponding days of the week thus:—

	A.	B.	C.	D.	E.	F.	G.
January	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31				
February				1	2	3	4
	5	&c.	&c.				

2. The following peculiarities will present themselves:—

First. The arrangement of dates and days of the week, correspond in these months: January and October; February, March, and November; April and July; September and December; the other three months May, June, and August, are isolated months, having no correspondence of arrangement with any other.

Second. In leap years, the dates from 1st March to 31st December inclusive, will arrive a day later in the week. As the additional day of leap year comes at the end of February, it does not affect the correspondence of dates and days for January and February.

Third. The vertical dates of January and October fall on the same days.

Fourth. The vertical columns of dates are found in the same order and succession in all the months, but under different days of the week: the agreements noticed in Obs. first excepted.

Fifth. The dates of the first column of January, and similarly the other columns, fall in *May*, one day of the week *later*; in *April* and *July* one day *earlier* than they do in January.

Sixth. The dates of the 1st column of January (and similarly all the others) will in *August* fall *later* in the week by one day than they do in *May*; and in *September* and *December* one day *earlier* than they do in *April* and *July*.

Seventh. The same dates in *June* fall *earlier* in the week by one day than they do in *September* and *December*; and in *February*, *March* and *November* one day *earlier* than in *June*, or one day later than in *August*.

Eighth. If the 1st of January fall on any day of the week A, the following dates will fall on the same day:—

- | | | | | | |
|----|-----|-----|-----|------|----------------------------------|
| 1. | 8. | 15. | 22. | 29th | of January and October. |
| 5. | 12. | 19. | 26. | — | of February, March and November. |
| 2. | 9. | 16. | 23. | 30th | of April and July. |
| 7. | 14. | 21. | 28. | — | of May. |
| 4. | 11. | 18. | 25. | — | of June. |
| 6. | 13. | 20. | 27. | — | of August. |
| 3. | 10. | 17. | 24. | 31st | of September and December. |

3. The dates and months, exhibited in Observation 8th of Article 2, are grouped together in Capt. Shortrede's scheme on the inner or smallest card, and arranged in a peculiar order, as the author expresses himself, having reference to the eight Observations of Article 2.

4. Some years have 365 days and some 366: three years in succession have 365 days each, and the fourth year (with exceptions to be noticed) has 366 days. The year that has 365 days has 52 weeks and one day over; therefore, whatever day of the week begins such a year, also ends it. During three such years three days of the week in succession begin and end those years; the 4th day begins the 4th year; but as this year has 366 days, which are equal to 52 weeks and 2 days, the day after the 4th day, that is, the 5th day, will end the year. Calling these four years a series, we may say that whatever day of the week begins the series, the 5th day in succession ends it. The 6th day in succession begins and ends the 1st year of the next series; the 7th day begins

and ends the 2d year of that series; the 8th day (i. e. the 1st week-day with which we commenced) begins and ends the 3d year; and the 9th (or 2d day) begins the 4th year; but does not end it, because it has 366 days; the 10th (or 3d day of the week) ends it: and so on.

5. Let the days of the week be called *a, b, c, d, e, f, g*, without, at present, particularising which day of the week is called *a*, or *b*, or *c*, &c. The following Table is constructed on the principle explained in 4. It consists of series of 4 years each which are marked 1st, 2nd, 3rd and 4th; the days of the week that commence these years are placed vertically underneath; the fourth year has always two letters; the first indicating the day of the week on which that year begins, the second letter, the day on which it ends. The arrangement commences with the 1st day of the 1st year of any century; with the year 1, or 101, or 1601, or 1801; and the 1st of January is supposed to fall on a day of the week called *a*.

Series.	1st year.	2nd year.	3rd year.	4th year.
1	a	b	c	d and e
2	f	g	a	b and c
3	d	e	f	g and a
4	b	c	d	e and f (Table 1.)
5	g	a	b	c and d
6	e	f	g	a and b
7	c	d	e	f and g
8	a	b	c	d and e

6. After 7 series of 4 years each=28 years, the same succession commences.

7. From Table (1) may be formed another (which will be given hereafter) exhibiting all the years of a century that begin with the same day; but it will be more convenient to shew first, how the centuries commence; and of centuries, the centuries of Old Style first; reminding readers that, according to Old Style, every 4th year, without exception, is a leap year, and consists of 366 days.

8. By attending to Table (1) it will be seen, that the series consist of lines of years and days of the week in succession; each series has 4 years and 5 days of the week. If we fancy weeks lengthened out into one uninterrupted line of days, the first day *a* of the second week will be called the 8th day; 4 weeks will be called 28 days; and Table

1, or rather the succession which it shews, may be represented by the following progression :—

Series, 1 2 3 4 5... 25 ...50, &c.

Years ending these series, . 4 8 12 16 20...100 ...

Days beginning these years, 4 9 14 19 24...

The common difference of the years is 4, of the days 5 : the 25th term will therefore be year 100 and day 124 : 124 days equal 17 weeks and 5 days ; therefore the 100th year will begin with the day *e*.

9. According to Old Style this progression may be extended to series 50. The fiftieth term of the progression will be, year 200 and day 249 ; 249 days equal 35 weeks and 4 days ; therefore the 200th year begins with the 4th day *d*. In the same manner it may be found that the year 300 begins with the third day *c* ; the 400th with the 2d day *b* ; the 500th on the first day *a* ; the 600th on the 7th day *g* ; and the 700th on the 6th day *f*.

10. Hence every 100th year commences on a week-day, one day earlier than the preceding 100th year : consequently if the year 1 of any century begins on any week-day *a*, the year 1 of the next century will begin on the week-day *g*,—*i. e.* a day earlier.

11. In Old Style all the days of the week in their turn commence a century and a 100th year.

12. The following Tables are formed according to Articles 8—10. The Table marked (2) shews how each hundredth year begins. Table (3) shews how each century or first year of each 100 begins :—

Days of the week	e	d	c	b	a	g	f	(Table 2.)
begin Hundredth years, <i>i. e.</i> years 100, 200, 300, &c.	1	2	3	4	5	6	7	
	8	9	10	11	12	13	14	
	15	16	17	18	19	20	21	
	22	23	24	25	26	27	28	
	29	30	31	32	33	34	35	
	36	37	38	39	40	41	42	

Days of the week	a	g	f	e	d	c	b	(Table 3.)
begin centuries or years 1 of 100 ; 1 of 200, &c.	1	2	3	4	5	6	7	
	8	9	10	11	12	13	14	
	15	16	17	18	19	20	21	
	22	23	24	25	26	27	28	

13. Now follows the Table (marked 4), exhibiting all the current years of a century that begin with the same day of the week. The primary arrangement is for the current years of the 1st century beginning with year 1. Underneath this, the letters denoting the days of the week are so arranged as to shew how the superincumbent columns of years begin in the other centuries in succession; an arrangement which will be quite intelligible by attending to Art. 10.

a	b	c	d	e	f	g	
1	2	3	4	—	5	6	
7	8	—	9	10	11	12	
—	13	14	15	16	—	17	
18	19	20	—	21	22	23	
24	—	25	26	27	28	—	
<hr/>							
29	30	31	32	—	33	34	
35	36	—	37	38	39	40	
—	41	42	43	44	—	45	(Table 4)
46	47	48	—	49	50	51	
52	—	53	54	55	56	—	
<hr/>							
57	58	59	60	—	61	62	
63	64	—	65	66	67	68	
—	69	70	71	72	—	73	
74	75	76	—	77	78	79	
80	—	81	82	83	84	—	
<hr/>							
85	86	87	88	—	89	90	
91	92	—	93	94	95	96	
—	97	98	99	100	—	101	
<hr/>							
g	a	b	c	d	e	f	for odd years of 2d century.
f	g	a	b	c	d	e	_____ 3d _____
e	f	g	a	b	c	d	_____ 4th _____
d	e	f	g	a	b	c	_____ 5th _____
c	d	e	f	g	a	b	_____ 6th _____
b	c	d	e	f	g	a	_____ 7th _____

14. It will be seen that the above columns of years begin with fixed days for fixed centuries. If the century begins with any day, the first column of years will begin with that day, the other columns with the next day in succession. Table (3) shews how the centuries commence; and when this is known, Table (4) will readily shew how the years commence.

15. These columns of years are arranged in Capt. Shortrede's scheme in a circular order, and occupy the seven divisions of the outer card, in

the same succession in which they stand above, with a few exceptions.

16. The exceptions are the leap years, which are advanced one division to the right of their proper division, for the reason given in Observation 2 of Article 2: this occasions error in week-days corresponding to January and February, but the scheme says, "in leap years for January and February use the half blank space to the left, then opposite the given date is the day of the week." This is obscure; and, if I understand the author aright, incorrect. The meaning of the author appears to be, "use the division containing May as if January had been there, and fancy February to be where June is." This will lead to error. The direction should be—for January and February in leap years take that day which is one division to the left of the day opposite to the date. The week-day for January and February is one day earlier than the day opposite to the date.

17. Although the leap years are thus advanced, the author of the scheme appears to have left half the digits of the numbers expressing those years in their proper divisions; for there are four 4s, 2s, and 6s and five 8s in different divisions. This is objectionable, because these numbers may bewilder those who are reckoning for the current years 2, 4, 6, 8; and, if the scheme be printed for general use, should be omitted.

18. The middle card of the scheme contains not the centuries of (3) but the full centuries or hundreds of (2) for the convenience of reading. In Table (3) the days of the week for the current years of centuries are shewn in 7 lines: but in the scheme the full centuries and their fixed days revolve in a circle; and the days are readily made to assume their positions relative to the current years.

19. If the scheme had a century division, then by adjusting the century division, bearing the name of the week-day commencing the centuries which it contains, with the year division containing the years 1, 7, 18, 29, all those years would be shewn to commence with that day; and the years in the other divisions, with the days standing below them, for those centuries.

20. But the hundred years or full centuries are more convenient for reading, as years 101, 1801, 1841, &c.; then the 100dth year must be so adjusted to a year division that the day on which the following cen-

tury commences, shall fall exactly under the division containing years 1, 7, 18, 29, &c.

21. The scheme has been regulated according to the hundreds or full centuries; and therefore, when it is to be used, the full-century-division must be adjusted with a current-year-division in accordance with Art. 20.

22. By comparing Tables (2) and (3) it will be observed, that each hundredth year commences two days earlier than the succeeding century. The 2 hundredth year of (2) commences with *d*; the 3d century of (3) begins with *f*; the 3 hundredth of (2) begins with *c*; the 4th century begins with *e*; in each case the hundredth year begins 2 days earlier; therefore, in using the scheme the full-century-division is to be adjusted with the current-year-division 2 remove to the left from the division containing years 1, 7, 18, 29, &c; that is, with the division containing the years 5, 11, 22, 33, &c.

23. But, because the hundredths or full centuries of Old Style are all leap years, they are thrown one division to the right according to Art. 16, and are in consequence to be adjusted with the year-division containing the years 6, 17, 23, 34, &c. The hundreds or "full centuries," do not commence with the day of the week over which they stand, but with the day to the left; consequently, although the full-century-division is shifted, the week-day commencing the next century or the year 1, falls in the right place under the division containing year 1.

24. The division containing the years 6, 17, 23, 34, &c., have two cyphers 00 for reference. If the scheme be published for general use, it would be an improvement to substitute a black dot, such as is used in the Nautical Almanac to represent the New Moon.

25. Let us now turn our attention to the New Style. In the year 1752, it was "enacted by 24 Geo. II. c. 23, that instead of cancelling *ten* days as Gregory XIII. had done, *eleven* days should be left out of the month of September; accordingly, on the second day of that month, the Old Style ceased, and the next day, instead of being the third, was called the fourteenth, and by the same act, the beginning of the year was changed from the 25th of March to the 1st of January."—*Ency. Met. Mis. and Lex. vol. iii. art. Calendar, p. 155.*

26. It was likewise enacted, that the Gregorian correction should be applied to certain years specified. According to the Gregorian rule,

every year divisible by 4 receives a day, or has 366 days. But every year divisible by 100 and not divisible by 400 has 365 days. The year that is divisible by 100 is also divisible by 4, since 100 is a multiple of 4: this part of the rule is therefore an exception to the first part, since there are years divisible by 4, which instead of having 366 days, have only 365. These years may be considered as losing a day to which they are entitled by the first part of the rule. The following are the years that lose a day. (It is to be remembered that those years which are divisible by 400 have 366 days: this is a part of the Gregorian rule.)

1700, 1800, 1900 — 2100, 2200, 2300,
2500, 2600, 2700 — 2900, 3000, 3100, &c.

27. Consequently, the correspondence of dates and days in Table (1) will not answer continuously for the New Style: it will be interrupted in the New Style at the 100dth year, corresponding with the 4th year of series 4 and marked (a) in the Table. The 100dth year begins and ends with e, because it is not a leap year; the next century, that is, the year 1 of the next century consequently begins with f; and the succession given in (1) will be again interrupted at the next hundredth in the same place at (a), which place will now be occupied with c and d, because the first year begins with f and not with a. Although Table (1) is referred to in this place, it is not to be understood that the letters a, b and c, have the same signification in New Style that they have in Old Style: a in Old Style may be one day of the week, and in New Style another. But proceeding as above, the days beginning the hundreds of New Style may be found out, and the following Table formed, marked (5): in which the letters are slightly altered in character for the sake of distinction, but retain the same relation of time or succession.

Week Days.	e.	c.	a.	f.
Hundreds of New Style.	100	200	300	400
	17	18	19	20
	21	22	23	24
	25	26	27	28
	29	30	31	32
	33	34	35	36

(Table 5)

28. Observe here that only four days of the week begin the hundreds of New Style; and three days of the week never have that privilege, not for 40 centuries. The years in column *f*, are all leap years in New Style. This accounts for that arrangement of Capt. Shortrede's scheme, which occupies only 4 of the 7 divisions with N. S. centuries.

29. About the time of the 40th century, the Vernal Equinox will be 1 day nearly in advance of the 20th of March; in which case if the British Calendar and British Parliament be in existence, it may be found necessary to throw out a day from the Calendar. If the measure be adopted in the year 4000 A. D. then this year will not be a leap year, and as 4000 is a multiple of 400, and consequently falls in column *f*, the year 4000 will begin and end with *f* Art. 4; the week-days *a* and *c* will go out and *b* and *g* will occupy their place for the next 40 centuries, during which period the hundreds will begin thus:—

d	b	g	e	
100	200	300	400	&c.

Centuries and years and hundredth years will begin a day earlier. By adjusting the "full-century-division one place to the right of 0 0 for every 40 centuries," according to the directions given in the scheme, a correction will be effected for the *current* years; but as the centuries and week-days are in fixed position on the same card, the prescribed adjustment is not effective for the *hundredth years* or *full centuries* on the middle card.

30. It is now time to shew the relation between the week-days of Old and New Style. On the 3d of September 1752, New Style was introduced in England, when the 3rd of September was called the 14th (25). Consequently the 14th of September N. S. fell on a certain day in the first week, but the 14th September O. S. fell 11 days after in the second week: therefore the New Style *dates* may be said to occur 11 *week-days*, that is, 1 week and 4 days, that is 4 *week-days* earlier than O. S. *dates*.

31. If it should ever happen that a day is rejected from any year by New Style and not by Old Style, then that year in New Style will end 1 day sooner than in Old Style; and consequently the next year of New Style will be another day earlier than Old Style; that is 12 days of date or 5 *week-days*; and as often as this happens, New Style will be an additional day earlier than Old Style.

32. This happens in those years of N. S. which are divisible by 100, but not by 400; that is in the years contained in the columns *e, c, a*, of Table (5). The following *centuries* begin as many days earlier in New Style than they do in Old Style, as are indicated by the numbers below them.

It is necessary to keep in mind that, as the intercalary day is thrown out in these years, at the end of February, this suppression of a day does not affect the calculations for the dates and days preceding the 28th of February: it makes those years *end* sooner, but not *begin* sooner or later in the week.*

Centuries, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30.

Days, ... 11, 12, 13, 13, 14, 15, 16, 16, 17, 18, 19, 20, 21, &c.

Consequently the years from 1801 to 1900 inclusive begin 12 days earlier than they do in Old Style.

The *hundreds* of New Style advance as below:—

Hundredth Years, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29.

Days, ... 10, 11, 12, 13, 13, 14, 15, 16, 16, 17, 18, 19, 19.

Week Days, ... 3, 4, 5, 6, 6, 0, 1, 2, 2, 3, 4, 5, 5.

33. If New Style be carried back in theory, the preceding arrangement will shew that New and Old Style agree in the following hundredth years or full centuries.

Years A. D. 300, 1200, 1300, 2200, 3100, 4000, 4100.†

34. The year 1841 N. S. began on Friday, therefore the year 1841 O. S. began 12 days or 5 week-days later; viz. on Wednesday. The year 1800 N. S. began on Wednesday; the year 1800 O. S. began 4 days later on Sunday. But 1800 O. S. stands in column *b* of Table (2), consequently *b* is Sunday, and 1800 N. S. stands in column *c*. of Table (5) therefore *c* is Wednesday. Therefore the letters indicating the days of the week have the significations attached below:—

O. S. Table (2) *e* Wednesday.

d Tuesday.

c Monday.

b Sunday.

a Saturday.

g Friday.

f Thursday.

N. S. Table (5) *e* Friday.

c Wednesday.

a Monday.

f Saturday.

* The note at the foot of p. 35 *Cab. Cyc. Chronology of History*, "The Style" is partly erroneous.

† The agreement of 1200 commences on the 28th N. S. 29th O. S. of February of the year 1100, and terminates on the 28th N. S., 29th O. S. of February of the year 1300.

35. In Captain Shortrede's scheme, the days will be found one division to the left of the hundreds of O. S. which they begin, according to Art. 23 and 16. The N. S. hundreds will be found over their proper days, except the leap years of column *f*, which stand over Sunday instead of Saturday, Art. 23, 16.

36. It is essential to observe, that the scheme supposes the years both of Old and New Style to begin on the 1st of January.

I tested it with about a hundred dates taken from the "Cabinet Cyc." "Chronology of History;" "Hume's History of England;" "Bacon's Letters," and some anticipated dates carried forward by myself, and found the scheme to agree with all, except two. These were two from Bacon, as follows:—

1617. February 6th, Friday, Bacon, vol. 3d (Letters) page 361.

1620. March 8th, Thursday, do. do. — 599.

It subsequently occurred to me, that before the year 1752, the Ecclesiastical year began on the 25th of March, and consequently these years 1617 and 1620 should be read 1617-18 and 1620-21; because 6th February and 8th March fall near the end of years 17 and 20 of the old reckoning, and in the early parts of the years 18 and 21 of the new reckoning. The scheme (O. S.) agrees with this reading.

37. The dates from 3d to 13th September inclusive 1752, never existed in the British Calendar, Art. 25th; September the 2d was the day immediately preceding the 14th. By reckoning backwards from 1814 I find that the 14th fell on Thursday, consequently the 2d fell on Wednesday. Old Style in the scheme points to Wednesday, but Sept. 2d, 1752, N. S. points to Saturday. This disagreement was expected. Old Style is continuous, New Style carried back, is at fault between the 2d and 14th September 1752. A paper in the Rambler, is dated Saturday, March 14, 1752; therefore the 2d of September following fell on Wednesday. A paper in the Adventurer is dated Tuesday, November 7, 1752; therefore the 14th of September preceding was Thursday. The following dates agree with Old Style of the scheme, but not with New Style.

Tatler,	Saturday, March 11,	1709-10
„	Tuesday, February 28,	1709-10
„	Thursday, March 2,	1709-10
Guardian,	Tuesday, March 24,	1712-13

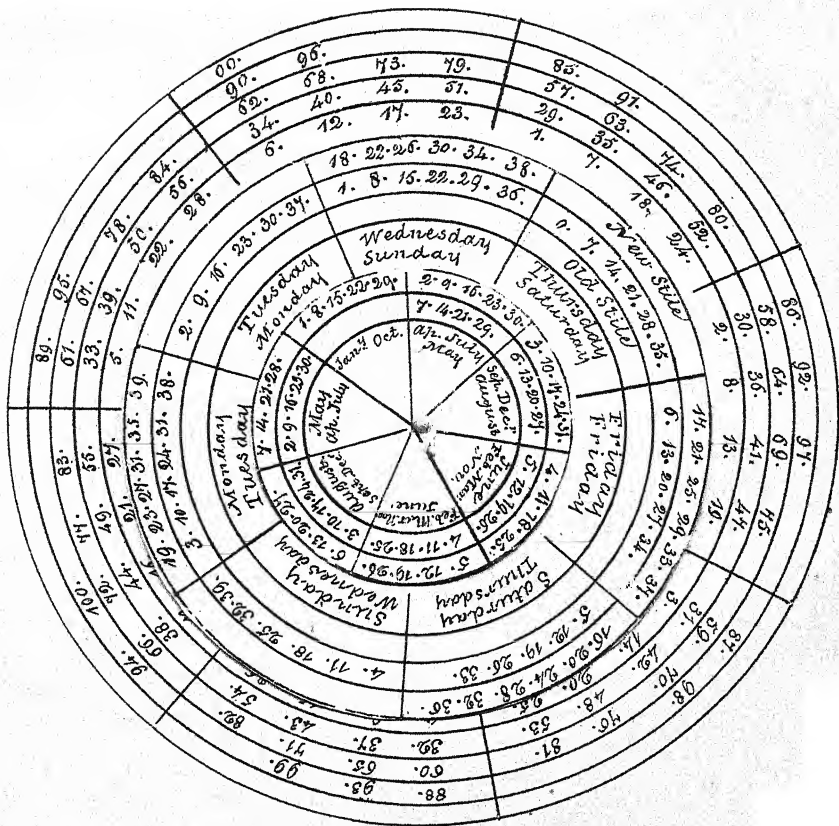
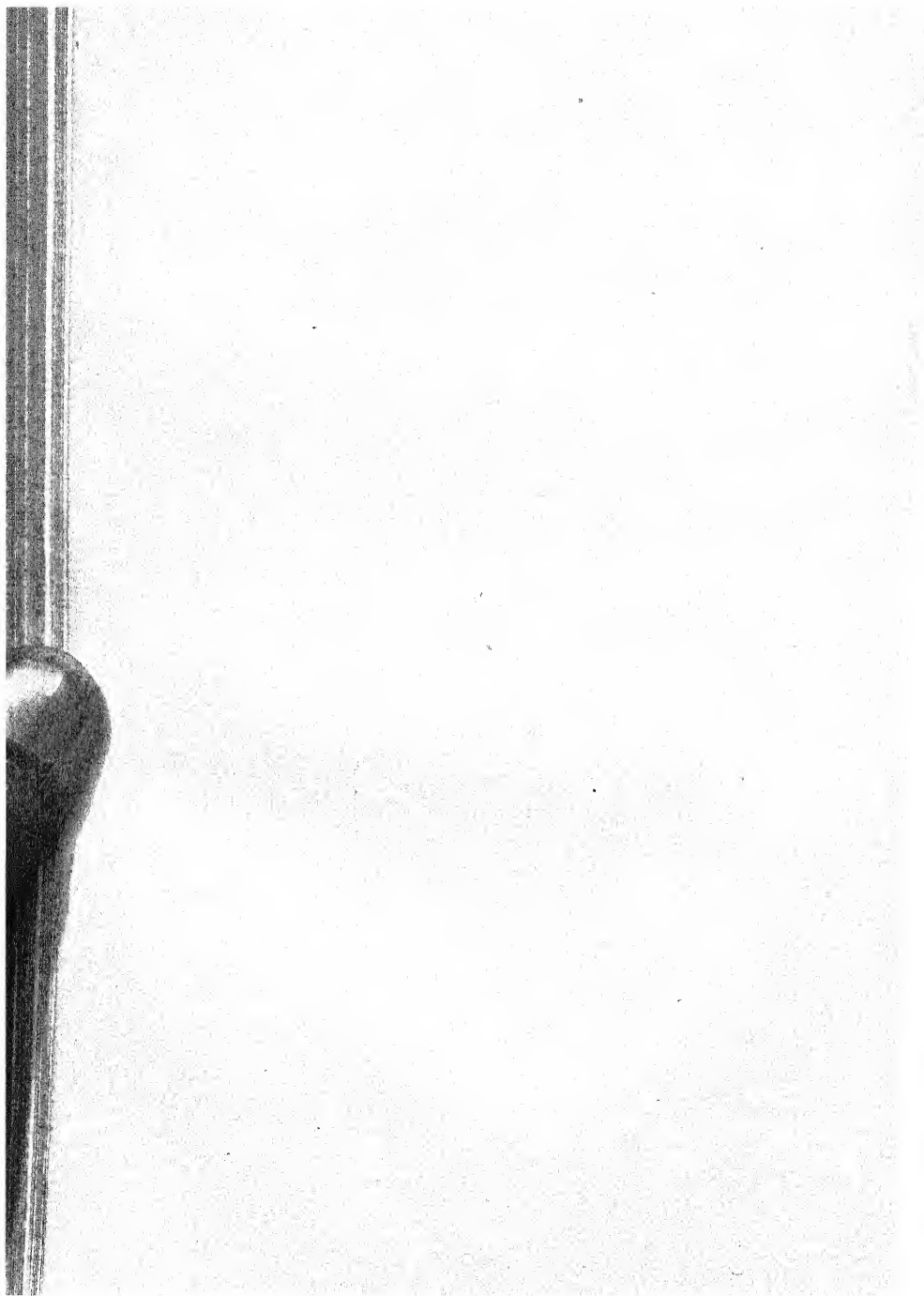


Table to accompany Mr. Master's Notes



Guardian,	Wednesday,	25,	1713
„	Friday, July	13,	1713
Spectator,	Monday, October 20,	1712	

Where the two years are given, the ecclesiastical and the historical, the scheme agrees with the second or historical.

The inference is that the scheme, as matter of *fact*, is unservicable for dates in New Style earlier than the 14th September 1752; and similarly for Old Style as far in the “dark backward and abysm of time” as the first fault occurs; the *year of confusion* for instance.

38. In the author's directions for dates before the Christian æra, it would, perhaps, be better to substitute the word *year* for *date* in the words “subtract the given *date*.”

39. After the foregoing observations, the reason of the prescribed manipulation of the scheme will be understood.

By adjusting the century division to the division 00, the days commencing the current years fall under the right divisions by Articles 22; 23; 13; 14.

The day on which a year begins is the day on which these dates of January fall;—1 (of course) and 8, 15, 22, 29 by Obs. 8 of Art. 2.

The day on which these dates fall is the day on which certain dates of other months fall; vide Observations 8. of Art 2; and which are arranged on the smallest card of the scheme.

Therefore by bringing a month to the division of a current year, the week-day above shews on what day the subjacent dates of that month fall (with slight variation for leap years.)

The other dates of that month lie under their proper week-days by Art. 1.

There are no directions given how the scheme is to be used for years of the first century; viz. the years 1, 25, 60, 99, and the like, which have no hundred before them. It is therefore necessary to insert a cypher or zero among the hundreds of 7, 14, 21 of Old Style, thus 0, 7, 14, 21, 28, 35.

40. In the course of this investigation, my attention fell upon the Tables that relate to the Dominical Letters. The numbers are the same both in the Tables and in the scheme. It may therefore be anticipated, that the scheme will soon supplant the Tables.

41. The scheme given here will do for years before Christ without the trouble of calculation. It is however more curious than useful.

In the smallest card, use the black characters for years A. D. and the red characters for years B. C.

The same in the middle card. The centuries of Old Style will do for centuries before Christ; reading thus, 0 hundred, 7 hundred, 14 hundred, &c. B. C.

In the year-divisions, leap years A. D. are marked with black; leap years B. C. are marked with red.

In the use of the scheme, for years A. D. adjust the centuries with the year-division having the black characters 00, and read as directed in Capt. S.'s scheme, with this exception; in leap years for dates from the 1st of March to the 31st December inclusive, take the week-day that is in the next division to the right of the week-day opposite to the given date.

For years B. C. adjust the centuries with the year-division, containing the two red characters 00; and read as directed for A. D. years using the red characters. In leap years for dates between the 1st of March and 31st of December inclusive, take the week-day that is in the next division to the left of the week-day opposite to the given date.

La Martiniere, 5th May, 1841.

W. MASTERS.

Remarks by Capt. SHORTREDE.

§ 16. The only HALF blank spaces in the whole Table occur in the outer card, and are those of the odd centurial years divisible by 4, *i. e.* leap years. These are denoted by writing only the final digit; the space for the other digit (easily supplied from those before or after) being blank. These spaces are therefore *half* blank.

The way in which Mr. Masters interprets the direction, certainly leads to error; but how such an interpretation can fairly be drawn from the wording, does not readily appear. I am directing how to use the Table for any current year of a century, and as an exception to the general rule occurs in January and February of leap years, I provide for it by the direction within the parenthesis, which of course I mean to be taken as referring to the subject then treated of; *viz.* the particu-

lar division of the outer card opposite which the given month is to be brought. The meaning is this—instead of the current year division on the outer card marked like the others with two digits, use the division on the left, which being for distinction marked with only the final digit is half blank—opposite this half blank space on the outer card in leap years adjust the January and February months—but never fancy the months to be in any other division than that in which they are written on the inner card.—R. S.

§ 17. No confusion can arise if it be considered that a single digit *never* represents the current year of a century. For example, the 4th year of the full century 18 is 1804, represented by 04, and not by 4 merely. The whole date being expressed by the current year preceded by its full century, if the odd year be written 4 this preceded by 18 becomes 184, being the year 84 of the full century 1. Moreover the outer card has the odd years of a century *in their order*, i. e. increasing uniformly from left to right, and not at random.—R. S.

§ 21. The only adjustment required is to bring the division of the middle card containing the full century opposite the division containing 00 on the outer card, and when this is done, no farther adjustment of the middle and outer cards to each other can have place throughout *that* century.—R. S.

§ 23. These being leap years require according to the direction for January and February (and therefore on January 1st) to have the month division brought opposite the single 0 to the left of the 00, being in that case *the half blank to the left*.—R. S.

§ 24. The black dot would require a special explanation, for which there is not room on the back of the card, without confusion or omission of something more important. A total blank would be preferable to a black dot, but to this there would be much the same objection.

Either of these would derange the principle on which the outer and middle cards are adapted to each other. This principle is, that when the full century for the time being is opposite the 00 or point of adjustment, every odd year on the outer card is to be read as if it had its proper full century digits before it. The 00 is to be read in the same way as any other year of the century.

The Table might have been made adjustable by any other zero as well as by 00; and by any other date as by the 1st of January, but

these on the whole are considered to be the most convenient. Had the Table been adjusted by 1st March, we should have got rid of all trouble about the 29th of February in leap year, but should have incurred the inconvenience with our present Calendar of reckoning two months of each year as part of the year preceding.—R. S.

§ 29. Quite true. The adjustment referred to is that by which the full centuries are brought opposite the proper division on the outer card. After 4000 and till 8000, the full century-division is to be adjusted by the division on the outer card containing 01 instead of that containing 00 as formerly. The current year is then to be read on the outer card as usual. The full century being opposite the 01 division, that of the 00 will be one place to the left. Hence the full century will commence on a week-day earlier by one than that over the full century on the middle card. This arrangement was preferred to that of shifting the places of the full centuries on the middle card, as hereby the series of full centuries may be continued indefinitely backwards or forwards by uniform common differences.—R. S.

§ 37. This inference is unwarranted. New Style commenced in 1582, and from that time was used generally in Catholic countries. It was adopted by the Protestants of Germany in 1700, and in England 1752. For dates previous to these epochs in the respective countries, this Table or any other as a matter of *fact* must be unserviceable for New Style dates; because such dates did not exist. It is serviceable throughout the whole range of Old Style dates, which still are used in Russia and by the Greek Christians. *The year of confusion* having occurred before the Christian Era, is *out of date*. All such cases are provided for generally by the directions for dates before the Christian Era, and for all such, Old Style reckoning, even when fictitious, is perhaps the most convenient. In such cases, however, there is but little occasion to know week-days as a matter of historical reference.—R. S.

§ 39. No particular directions are needed. The full century in that case is 0, and at first this digit was inserted in the place now occupied by the letters O. S. The difficulty is sufficiently provided for by the remark, that the series of full-centuries *may be continued indefinitely*. —R. S.

*Notes on the Gems found at Beghram. By J. S. CHAPMAN, Esq.
Assistant Surgeon, 16th Lancers.*

MY DEAR SIR,—Having observed in the last number of the Journal of the Asiatic Society, the great interest you have taken in the Gems found in various parts of Afghanistan, and as you there make an earnest entreaty to be furnished with casts or impressions of all Gems, and particularly of those with inscriptions, I have the pleasure to send you a series of these singular relics discovered at Beghram, the locality of which spot has been so fully and ably described by Mr. Masson. For this purpose, my friend Colonel Cureton most kindly gave me free access to his cabinet, and all the Gems which I have selected for your notice are his, with the exception of the four last. Some of the specimens from Colonel Cureton's collection are of a superior order, equalling many of the antiquities of this nature found in Greece and Italy. One gem cannot fail in attracting much notice; viz. that of Abraham offering up his son Isaac; and there are others which will afford scope for speculation. Any other relics of this nature I may chance to meet with, I will send casts of the same to you.

I am, dear Sir,

Yours faithfully,

J. S. CHAPMAN.

Meerut, August 22, 1840.

No. 1. Garnets. A figure apparently intended for Apollo, as neatly and spiritedly executed as many of the ancient Gems of Greece and Italy.

No. 2. Cornelian. An historical gem of singular interest and value; the subject, Abraham offering up his son Isaac, is too clear to be mistaken, Genesis, chapter xxii—"And Abraham stretched forth his hand, and took the knife to slay his son. And Abraham lifted up his eyes, and behold behind him a ram caught in a thicket by his horns: and Abraham went and took the ram, and offered him up for a burnt-offering, instead of his son." The cast does not represent the knife and the figure on the altar so well as I could wish.

No. 3. Cornelian. A figure of Ceres, the style of execution almost equals the Apollo (No. 1.)

No. 4. White Cornelian. A well-cut head, Buddhist or Sassanian?

No. 5. Garnets. A head ornamented with earrings, and an inscription

round it. I imagine it to be Sassanian, for the peculiar character seems to resemble that found on some of the Sassanian coins, of which I send impressions; it is evidently not Bactro-Pehlevi.

No. 6. Cornelian. A head coarsely engraved.

No. 7. Cornelian. A head apparently Sassanian, from the peculiar stile of head-dress, large pendant earrings, and moustache. The execution of this gem is particularly good.

No. 8. Garnet. A head of the same character as the last, and equally well executed.

No. 9. Cornelian. A bust, neatly and well engraved.

No. 10. Cornelian. A head, injured and coarsely cut.

No. 11. Cornelian. An animal with long ears or horns, from its hoofs probably intended for a stag.

No. 12. A Bronze Seal. I cannot make out the subject; surely it is not intended for Apollo destroying the Python? The figure is represented as trampling on the monster; he holds the tail with his right hand, and there is something in his left, but whether an instrument of destruction is not evident.

No. 13. An Agate Seal, the figure of an Indian bull.

No. 14. A Bronze Ring. This is a very common device on the rings found at Beghrum. I have seen at least thirty with the same, and better finished than this.

No. 15. An Agate Seal. A coarsely executed bird of the genus *Anas*.

No. 16. A Copper Seal nearly effaced; it appears to be Sassanian, and to represent a fire altar, with the two supporters.

No. 17. A Bronze Ring, affording some matter for speculation. A large bag of relics was brought to me from Beghrum, consisting of coins, pieces of brass ornaments, rings, &c. &c. I found amongst the lot at least fifty rings of various sizes and shapes, having on them this particular emblem or device.

No. 18. Cornelian. A horseman.

No. 19. A Bronze Ring which I found in the bag above mentioned; the figure of Victory is in high relief; it is purely Grecian, and is spiritedly and gracefully executed; the impression does not do it justice.

No. 20. Another Bronze Ring from the bag, with the same device as No. 14.



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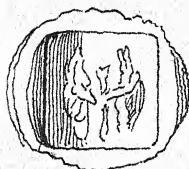
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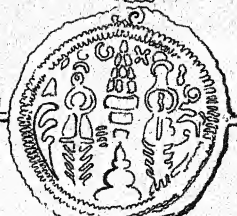
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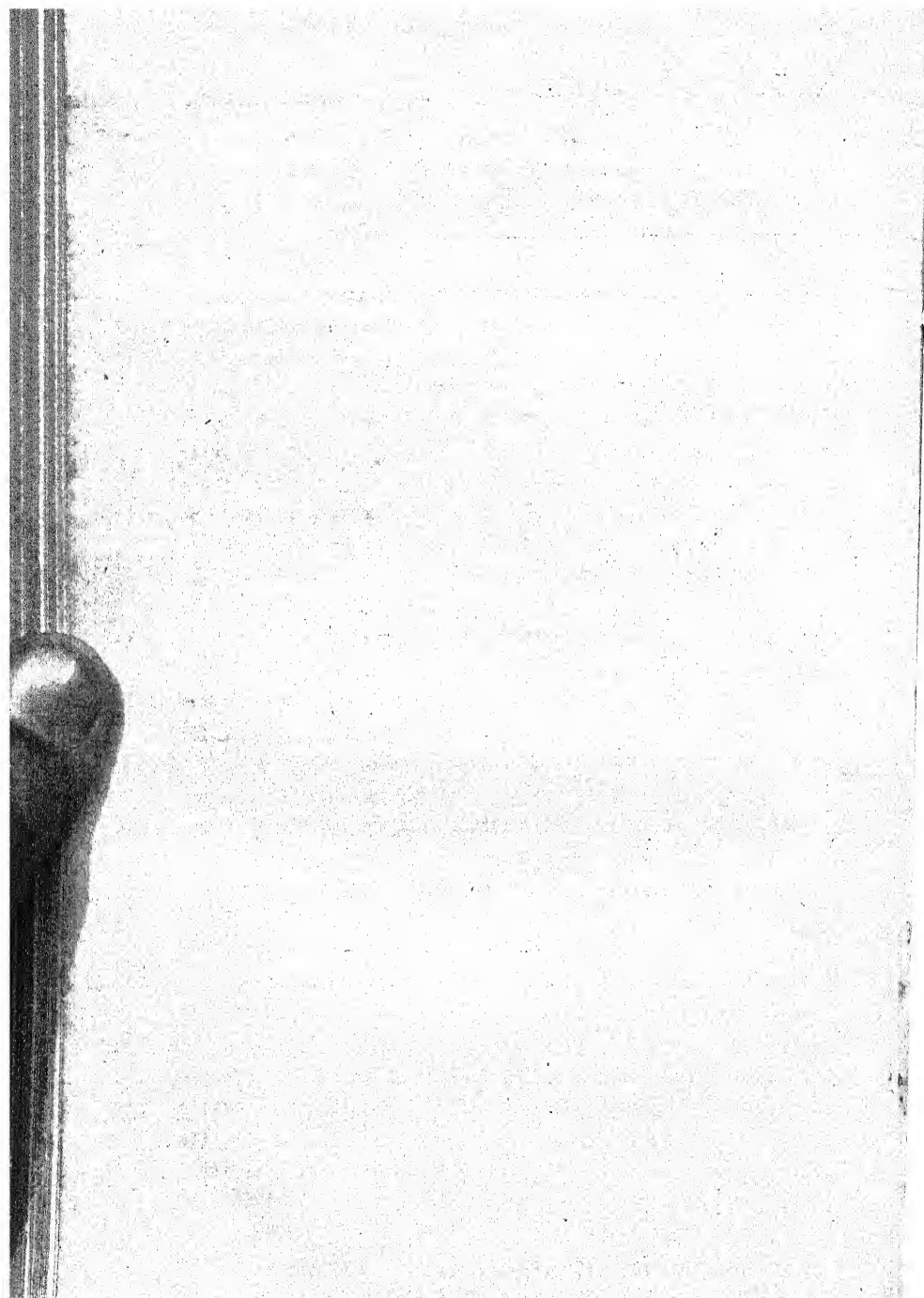


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Letter to the Secretary of the Asiatic Society, on the recent Cataclysm of the Indus, from DR. FALCONER, Saharunpoor, July 6, 1841.

MY DEAR SIR,—I have just perused in a letter from the frontier a brief and hurried account of some of the particulars of a grand Cataclysm of the Indus! certainly one of the most remarkable natural catastrophes hitherto recorded as having occurred on the continent of India, or any where else, in the deluge way. The details as yet are very imperfectly given, but they are of so intensely interesting a character, that I do not hesitate a moment to communicate them to you, in the hopes that the Government may do its best towards collecting authentic information, regarding the cause, extent, and effects of this flood. We all know how little impressed uncivilized nations are in the events of this kind : after the lapse of a few years, when the immediate effects have gone by, they are generally remembered only as imperfect traditions. The Government could with little trouble collect most of the desired information, through the political officers on the North-Western frontier ; but much will be lost in the authenticity and fullness of the particulars if any considerable delay occurs in making the inquiry. I am especially interested in the event, from being well acquainted from personal observation with the remote and little known tract in Thibet, which I believe to have been the great scene of operations on the occasion ; and I fancy I am the only person now in the country who has been there. Should the Government take the inquiry in hand, I will be most happy to give my humble aid in pointing out the kind of information desired, the situations where inquiry ought to be made, &c. and to work up the whole into a connected account, if desired.

You are well aware, from the descriptions of Burnes and other travellers, what a formidable river the Indus is near Attock. The depth was ascertained by Lieut. Wood, from actual measurement, to exceed many fathoms (I cannot at this moment quote the exact amount,) at the ferry between Attock and Khyrabad, notwithstanding that the velocity of the stream at this point is 9 knots an hour. It would appear that the river had been observed during *several months* past to be most unusually low, and to such an extent had the body of water lately diminished, that the deep bed at Attock was converted into an *easy ford* ! (I quote

the words used.) All at once this state of things changed, the river burst in an awful débâcle through the obstacles which had held up its water somewhere along the upper part of its course, and rushed down the valley in a mighty flood. The particulars regarding the effects, are probably derived from native accounts. The words of the letter are nearly thus: "*Hundreds of VILLAGES and TOWNS, including Khyrabad and Attock, were swept away, with thousands of human beings and cattle. The Lundaye, (or Cabul river, which joins the Indus, close above the fort of Attock,) had its water held up, and forced back so as to inundate the towns of Monshera and Akora (situated a long way up its course in the plain of Peshawur.)*" "In the Huzara country," probably between Durbund and Attock,) "*the flood swept away artillery guns, with many hundreds of infantry and sowars; and old Sham Sing Atarewallah, a seik sirdar, had all his camp and followers carried down the stream, while he was himself, with a few troops, aloft pursuing the rebel, Paeouda Khan, (chief of Tuhalee) through the hills. I have as yet only heard of the course of the inundation as far as Dera Ismail Khan, whence also the accounts are very distressing, and so they will continue to be I suppose, till it reaches the sea, for nothing else can contain it. But what must have been the condition of the unknown country flooded above the avalanche, since rumours of its fall have been prevalent for four months back? I conclude it must be the plains of Ghilgeet. The authorities on the Indus report the very foreign appearance of many bodies washing down.*"

So much for the particulars already received, which are only sufficient to excite our interest about what remains to be known. Now so far as I am aware, there is no flood on record at all approaching this grand débâcle of the Indus; that of the Val de Bagnes, of which so graphic an account has been given by Basil Hall, was confined to one of the subordinate lateral valleys of the Rhone, while the flood of the Indus has in all probability washed its desolating career across the continent of India. The gigantic scale of its operations can be guessed from the facts above given. The town and fort of Attock are situated on a rock, well raised above the river. Yet the place is here described as having been swept away, with hundreds of the towns and villages! The inundation of Akora and Noushera, situated so high up the Cabul river, speaks volumes to the same effect; while the suddenness and unexpected nature of the catas-

trophe are emphatically told in the fate of Sham Sing's followers ! The drifting of artillery guns is quite a novel fact in geological operations of this sort : one would fancy, that it would require a good stiff current to walk away with a 24-pounder.

As to the cause, there can be little doubt but that it was occasioned by some unusual barrier temporarily established in the bed of the river somewhere high up its course, damming up its waters till they attained a volume too great for the strength of the obstruction. This may be fairly concluded, from what is said of the previous state of the ferry at Attock, which was in a great measure dried up. It is, you will observe, inferred that the stoppage occurred near the plains of Ghilgeet ; I suspect however, that it must have taken place much higher up, either on the "R-gem-tsoh," or united body of the Indus above Iskardoh ; or what is still more probable, on the "Noobra-tsoh" river, or Shayook above its junction with the Ludakh or great branch. During my stay in little Thibet, I, as well as Vigne, was able to settle the disputed geographical point, regarding which the statements and opinions of Elphinstone, Moorcroft, and Burnes, about the existence and point of confluence of two great branches of the Indus, are so conflicting. There are two great branches, the Southern or Ludakh river, along which Moorcroft descended ; and the Northern or "Noobra-tsoh" branch (Shayook of Burnes, &c.) the confluence of which, (seen by Vigne and myself,) takes place at Chundon, close to the castle of Kirrus, about a day's journey above Iskardoh, and a long way below "Duroz." During my stay at Iskardoh, I learnt from the Rajah Ahmed Shah, that great floods occasionally take place at irregular intervals, in consequence of the Noobra-tsoh river, (so called from the purgunna of Noobra through which it flows,) getting blocked up by avalanches and masses of ice. This river has one of its principal origins in a great lake, as yet unvisited by Europeans, in the Kara Korum mountains. After winter seasons of unusual severity the lake gets sheeted over with an enormous mass of ice, and the valley of the river below the lake is liable to be filled up with great avalanches of ice and snow. When events of this kind go together, the disrupted masses of ice from the lake, added to the avalanches, go on accumulating till a huge barrier is formed, which dams up the river, leading to tremendous floods when the water bursts through the obstacle. A case of this kind was des-

cribed to me by the Rajah, as having occurred within his recollection, attended with desolating effects along the valley of the Indus in little Thibet. The river rushes down in a mighty torrent, sweeping every thing before it. Further I learnt at Attock, when going over the fort in 1837 with Burnes, that such heavy floods have been known in the river there, that the water has risen over the top of the "*Ab-doord*" bastion, perhaps 30 feet high, which insures the supply of water for the fort if besieged, and the base of which is usually almost on a level with the surface of the current. But I was not above to connect the two events as coincident in time of occurrence.

I do not think it at all likely that the obstacle occurred any where below Iskardoh, both from the configuration of the valley of the river, and from the difficulty of conceiving a barrier of snow or ice to be formed so low down; whereas higher up, on the Noobra river, avalanches are so common, and on so grand a scale, that it is easy to conceive the river being blocked up: and the temperature of the water is so low, that its action in the way of melting the ice would be very slow and partial. This objection appears to me to apply to the whole of the united river, as far up as the junction of the Ludakh branch. The "*very foreign appearance of the bodies washed down,*" would indicate them to be at least from as high up as little Thibet, for the people of Ghilgeet and the "*Dardohs*" of that neighbourhood, are very much like the Pathans above Attock. The Chinese style of features first commences in and above little Thibet.

But these ideas at the best are merely conjectural, and I only advance them, with the object of guiding the direction of the inquiries. If the river really was so low at Attock as to be in the state of a practicable ford, it would seem to follow that the obstruction must have affected both branches of the Indus: for otherwise, the Ludakh river is large enough to supply of itself a large volume of water. The cause in that case would probably be found in a land-slip, or something of that kind, or mountain masses precipitated by an earthquake. An event of this sort is not improbable, for we know that in 1809 an earthquake of such force took place in Gurwah, that the Bishnoo Gunga river, one of the great branches of the Ganges, was blocked up below Goseenauth by a land slip, and the water rose to 40 feet above its usual level.

The points from which the best information may be expected, are Iskardoh in little Thibet; from Rajah Jubbar Khan, of Astore or Hussorah, in the Dardoh country, opposite Ghilgeet, where the Indus makes its great bend to the south; then from Jalkot in the Dardoh country, Durbund, Torbeila, Attock, Calabaugh, and the Derajats. The greatest effect of the flood will probably have been felt in the neighbourhood of Iskardoh; then near the low plains of Huramosh, G6r and Poorijee near Ghilgeet, where the river bends to the south; next at Durbund and Torbeila, where the effects must have been very great; then at the point where the Indus escapes from the hills into the plain of Chuch; then at Attock, and then at Calabaugh, where the river escapes from the salt range.

A few days more will likely put us in possession of many more authentic particulars derived from the whole line of the Indus, and should the flood turn out to have been really as grand and important an affair as appears from what we know at present, some inquiry regarding it should be instituted by those who have the power. The following occur to me as some of the most prominent points to be inquired into—the nature, cause, situation, amount, and date of the obstruction; length, breadth, and depth of the lake formed: and length of time occupied in its collection; date of the first perceptible subsidence of the river at Attock; and greatest amount of reduction estimated in decrease of depth, and if possible, in cubic feet of discharge per second, contrasted with average discharge; cause, period of, and “*modus operandi*,” of the yielding of the barrier.

Date of the débâcle arriving at different points along the river, and period of its continuance; volume of water discharged in cubic feet per second; velocity and depth of the current; greatest rise of water at different points; appearance, colour, consistence, and temperature of the water; extent of the inundation; amount and nature of the effects produced, in the destruction of land and loss of human and animal life; number and names of towns and villages destroyed; with particulars of any remarkable changes in the physical configuration of the tract through which the flood passed; date of subsidence at different points; appearances observed, and effects produced in the Delta of the Indus, during and after the flood; in the stranding of carcasses, animal or human; timbers; boats; amount of deposit;

silting up or clearing out any channels of the river previously navigable, or the reverse, &c. &c.

HENRY TORRENS, Esq. &c. &c. *Calcutta.*

This letter was laid before the Governor General, when, with the usual kindly interest evinced by His Lordship on all scientific subjects, assurances were given, that occasion would not be lost sight of, for the purpose of making due inquiry into the causes of the phenomena described. Lord Auckland indeed addressed Mr. Clerk, (Gov. General's Agent, N. W. frontier), at length on the subject; but before the letter reached its destination, Mr. Clerk had already deputed Dr. Jameson, Civil Surgeon at Umbala, and for sometime our officiating Curator, for the purpose of inquiry. The results of this interesting mission will be anxiously looked for.

H

Note on the Fossil Jaw, sent from Jubbulpore by Dr. SPILSBURY. By the Acting Curator, Mr. PIDDINGTON.

At the request of our Secretary, I add the following remarks to those of Dr. Spilsbury on this fossil. I could wish the task had fallen into the hands of one qualified to draw inferences, which I cannot venture upon doing, but must content myself with stating facts as I observe them.

Since Dr. Spilsbury's note was written I find that the matrix (which is unfortunately a very hard conglomerate of rolled pebbles in a paste of coarse calcareous sandstone) has been chiselled off, so as to clear the side faces of the molar plates more than is seen in Dr. Spilsbury's drawing. I proceed to remark on the peculiarities which the fossil in its present state presents to an inexperienced eye, and on comparing it with both recent and fossil crania in the Museum. In its general appearance the remarkable differences are,

(1) The narrowness of the teeth; (2) the deep sulcus formed by their great protrusion below the palatal bone; (3) the closeness of the plates of the teeth, and the angle formed by the molars and incisors, which cannot be distinguished as separate with the posterior part of the jaw; (4) the transverse breadth of the jaw at the point where

the arch above the teeth rises to the side of the curved alveola of the tusks and the suborbital part of the malar bones; (5) the length of the jaw. I take these peculiarities in the order in which I have mentioned them.

1. *The narrowness of the teeth.*—Upon comparing our fossil with two fossil skulls, both I believe from the valley of the Nerbudda, and three recent ones in the Museum, I find the following dimensions as to breadth of the teeth:—

			Incisor.			Molar at the ridges.
THE FOSSIL,	...	...	2.8	...	...	2.4
A. First Fossil Skull (perhaps Mastodon Elephantoides, .	}		3.1	...	...	3.5
B. Second,			3.0	...	...	3.2
Recent Skulls ordinary size, }	}		3.1	...	...	2.9
1st			2.8	...	..	3.1
2nd			3.8	...	...	3.9
Large one,						

It will be seen that Cuvier, whose note I copy at pp. 624, 625, says that the breadth of the teeth of the fossil elephant (speaking of that of Siberia) is greater than that of the teeth of the* modern Indian elephant, the fossil ones being from 0.08. (3.3 Ins. Eng.) to 0.09 (3.7 Ins. Eng.) while the recent ones are from 0.06. (2.7 Ins. Eng.) to 0.07 (3 Ins. Eng.) In connection with other measurements of length and breadth, this variation in our fossil seems of much import.

2. *Depth of the sulcus formed by the teeth and palate at its deepest part.*—I cannot distinguish that any part of the palatal bone has been chiselled away, and thus I assume this remarkable difference to exist. I measure it at the deepest part I can find, which is generally near the angle.

Depth from face of teeth to palate.

		Inches.		
THE FOSSIL,	...	4.0	...	and some matrix apparently remaining.
A. First Fossil Skull, } perhaps Mast. Ele- phantoides?... .. }	}		1.0	.. palate perfect.
B. Second.			2.4	... palate perfect.

* Taking, as will be explained, (§ 3), the posterior plates or part of them to have been used as molars.

Depth from face of teeth to palate.

Inches,

Recent Skulls, { 1st.	3.7	} ... palate perfect.
ordinary size, { 2nd.	3.8	
Large,	5.8	

The breadth of this sulcus may also be of importance in the few dimensions we have for comparison: they are as below:—

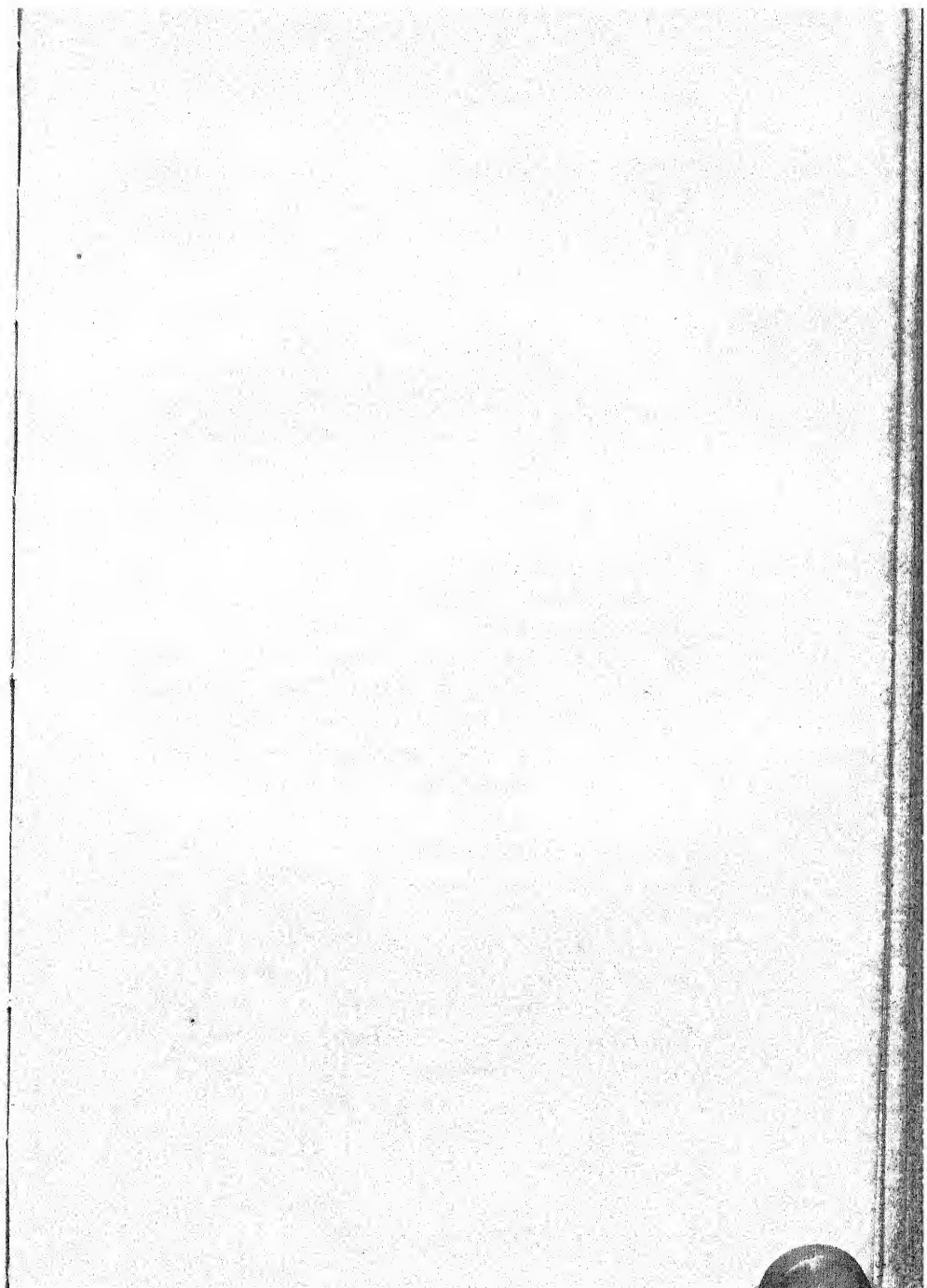
	Greatest breadth of sulcus.				Breadth at front of the incisors.
	Inches.				Inches.
THE FOSSIL,	4.4	...	...	...	1.7
A. First Fossil Skull,	3.0	...	...	...	1.2
B. Second,	4.8	...	...	...	2.8
Recent Skulls, 1st.	4.9	...	...	...	2.4
ordinary size, 2nd.	3.3	...	...	...	2.8
Large one, ... 3rd.	3.2	...	...	...	2.7

3. *The closeness of the plates of the teeth, and the angle formed by the molars and incisors.*—A space of two inches measured on the perfect part of the incisor included on:—

THE FOSSIL,	8 ridges or	...	...	plates.
A. First Fossil Skull,	5	..	...	$2\frac{1}{2}$,,
B. Second,	5	...	...	$2\frac{1}{2}$,,
Recent Skulls, 1st.	6	...	...	3 ,,
ordinary size, 2nd.	8	...	...	4 ,,
Large one,	6	...	...	3 ,,

4. *The angle formed by the molars and incisors.*—I have called this so, because in our fossil, to all appearance the incisors occupy what may be termed the horizontal plane of the jaw, and the series of plates, which in the recent elephant form the posterior part of the molars, called by Cuvier Os. Fossils, pl. 9. fig. 2, *lames osseuses dont l'ensemble doit former la dent*, seem to have partly constituted the molars; for they are perfectly ossified, and though in the chiselling the top has been taken off, it is difficult from the texture (which by the way is not at all mineralized but truly ossified) to suppose that they cannot have been in use, or that the animal could have managed with only the 4 or 5 inches of narrow incisor or molar, which now present a flat surface.*

* Supposing always that the length and the breadth of the jaw at the rise of the facial arch, as hereafter noted, does not allow us to consider it as that of a young animal.



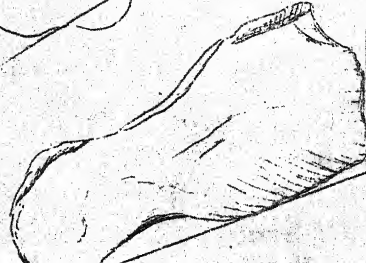
The Fossil

B. From River
Curios

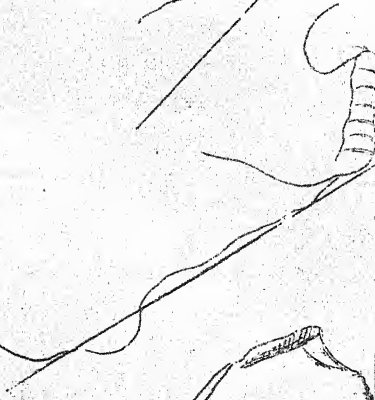
C. Mastodon Elephant

D. Recent
Bull. Mus.

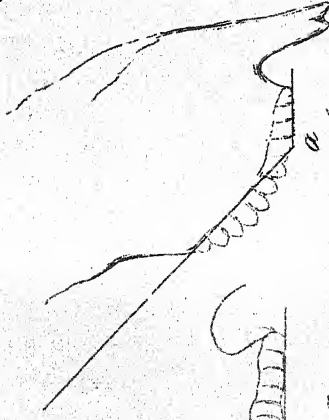
E. Large recent
Bull. Mus.



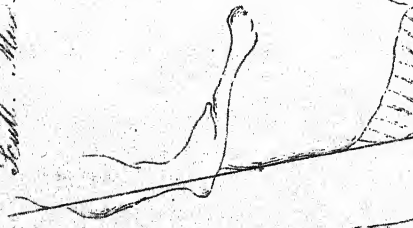
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136



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100



a
95

Three fossil and two recent jaws, to illustrate remarks on Dr. Spikbury's
Fossil Jaw from Jubbulpore

H. P. Webb.

What I mean, however, will be best shewn by the sketches in the plate, where—

A, is the Fossil: the angle at a being 110° .

B, Fossil head from Siberia (Cuvier Ossemens, F. pl. viii. fig. 1.) angle at a , 122° .

C, first Fossil Skull, Mus. As. Soc. perhaps Mastodon Elephantoides, angle a , of which one branch is the chord of the arc formed by the molars, 136° .

D, First recent Skull, No. 1 of the foregoing measurements angle a , 100° .

E, Large recent skull, No. 3 of foregoing measurements angle a , 95° .

In the plate the fossil A, with C D and E are drawn to the same scale, in B. from Cuvier there is no scale mentioned.

I have already alluded to the number of the plates in the incisor or horizontal part; in the posterior part of the jaw I should mention that they are separated by a soft, white, powdery mass, which easily gives way (much like chalk) to the knife; the plates themselves are hard, bony-like, and brittle, their length is about six inches, and on the most perfect side there are 21 plates in a space of $12\frac{1}{2}$ inches, all perfectly defined. In a recent skull I find 13 plates in a distance of 9 inches, which would give but 18 for $12\frac{1}{2}$ inches, and they are all loose, and so soft, as to yield to a slight touch of the tool. In a word, our fossil *seems* to have had these as true teeth, and not as germs, as in the modern elephant.

4. *The transverse breadth of the jaw.*—As this dimension is fortunately obtainable, I have thought it should not be neglected, as tending to throw light upon the question of the animal's age. As before mentioned, it is measured at that part of the incisive bone, where the arch rises. It should be remarked, that not being taken from a fixed point, it is, in so far, an approximative measurement depending on the accuracy of the eye in fixing upon nearly the same part of the arch as that which is taken in the fossil. The comparative dimensions are as follow:—

					Breadth of the jaw.
					Inches.
THE FOSSIL,	...	...	...	...	10.4
A. First Fossil Skull as before,	...	...	...	...	11.1
B. Second,	...	...	...	...	imperfect.

			Breadth of the jaw.
			Inches.
Recent Skulls, 1st.	...	...	10.8
ordinary size, 2nd.	...	...	9.1
Large size,	...	...	12.5

5. *The length of the jaw.*—This dimension should perhaps be called its depth. I mean by it a direct line from the centre of the foramen magnum to the front of the incisors (B. plate 1.) In our fossil we have not been able to find the trace of the foramen magnum; but we have cleared away enough, I think, to warrant our saying, that if perfect, the depth of the jaw (or length as expressed above) would be quite what the fossil now is. The following are the measurements:—

			Feet.	Inches.
THE FOSSIL, about,	...	...	2	0
Fossil Skulls, ...	...	...	...	imperfect.
Recent Skulls, 1st....	...	...	2	2
Ordinary size, 2d.	...	...	2	1
Large size, 3d. ...	...	...	2	7

From the foregoing measurements, the peculiarities of this fossil may I trust be elucidated. I cannot venture, with my limited knowledge of the subject, upon drawing inferences. The following passages from Cuvier may perhaps be of use, to those who have not the work at hand; and apart from the earnest desire both of Mr. Torrens and myself, and I am sure of every member of the Society, to see justice done to so steady and active a contributor as Doctor Spilsbury, to whom the Geology and Paleontology of India is so greatly indebted; the last one may serve in some degree to explain why we have thought it just to him that every thing relative to this fossil, should it prove new, should be placed upon record. It is no small encouragement to the pioneers in every walk of Natural History, to learn, from the hand of Cuvier himself, that it is to a single memoir and plate, which had been neglected for seventy years in the Philosophical Transactions, that we owe the most magnificent series of discoveries, which have yet illustrated the former state of our globe!

Museum, 31st July, 1841.

H. PIDDINGTON.

Notes from Cuvier.

Os. Foss. vol. i. p. 522.—I. "On a disputé sur le nombre des dents des éléphants: la Société Royale de Londres s'aperçut en 1715 qu'il

varie d'une a deux de chaque coté, et que la place de la division varie aussi; c'est à dire que la première dent est plus ou moins longue, à proportion de la seconde, suivant les individus.—Trans. Phil. Tome xxix, No. 349, p. 370."

Vol. ii. p. 177.—II " Mais le nombre (des lames des dants) pris sur des dents de longueur égale ne donnerait-il point de bons caractères? c'est ce que j'ai examiné sur un grand nombre de dents des *Indes* et *fossiles* et j'ai presque toujours trouvé les lames de ces dernières plus minces, et par conséquent plus nombreuses dans une même espace."

Vol. iii. p. 178.—" Un troisième caractère est pris de la largeur, tant absolue que proportionnelle, des dents; beaucoup plus considerable dans l'éléphant fossile que dans celui des Indes. On peut s'en assurer par la cinquième colonne de ma table: où l'on voit que les fossiles ont presque toutes de 8.08 a 9.09, de largeur; et les dents du vivant de 0.06. a 0.07."

* * * * *

Vol. iv. p. 180.—" Ainsi on ne peut pas considerer la minceur des lames comme un caractère de l'éléphant fossile aussi général que la largeur de ses dents, et que les formes de ses machoires et de son crâne; cependant la largeur seule de ses machelières suffit pour les reconnaître, parcequ'elle est beaucoup plus constante."

P. 199.—Speaking of three fossil skulls, brought from Siberia, from the banks of the Indighirska, by the intrepid Danish traveller Messerschmidt, who gave a drawing of the best of them to Breynius, who engraved it to accompany a memoir inserted in the Philosophical Transactions. (It is that from which the outline B. in our plate is taken,)

he says, p. 201 : “ Dès que je connus ce dessin de Messerschmidt, et que je joignis aux différences qu’il m’offrait celles que j’avais observées moi-même sur les mâchoires inférieures, et sur les molaires isolées je ne doutai plus que les *éléphants fossiles* n’eussent été d’une espèce différente des *éléphants des Indes*. Cette idée que j’annonçai à l’institut dès le mois de Janvier 1796 m’ouvrit des vues, toutes nouvelles sur la théorie de la terre ; un coup d’œil rapide jeté sur d’autres os fossiles me fit presumer tout ce que j’ai découvert depuis, et me détermina à me consacrer aux longues recherches et aux travaux assidus qui m’ont occupé depuis vingt cinq ans.

Je dois donc reconnaître ici, que c’est à ce dessein, resté pour ainsi dire oublié, dans les Transactions Philosophiques depuis soixante dix ans que je devrai celui de tous mes ouvrages auquel j’attache le plus de prix.”

P. S.—Since this paper was written, I find in the Society’s collection a strong corroboration of the surmise, that our fossil was an adult animal. A lower fossil-elephant’s jaw, sent down by Mr. Conductor Dawe from Nahun, has the teeth, (or tooth, for there seems only one,) of exactly the same breadth as our fossil. The whole length of it is 6.9 inches, of which only 4.5 inches are worn down, the remainder standing up 0.8 inches above the rest, as if it had not been brought into use. In 2 inches, there are 7 ridges of enamel ; our fossil having as will be recollected 8 ridges.

The dimensions of this lower jaw, compared with those of the lower jaw of our largest recent elephant (E of the plate,) are as follow :—

Large recent Elephant, E.
of the plate.
Inches.

Jaw from
Nahun.
Inches.

Depth of lower jaw from the crown of the worn teeth to the lowest part of the arch of the jaw,	8.0	8.9
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Thickness of the jaw at the thickest part,	7.4	5.8
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TEETH.

Entire length, (2 teeth,)	11.0*	6.9
Worn surface, (1 tooth,)	11.0	4.5
Projecting,	0.0	2.4

From hence it will be seen, that we have, from two spots at least 600 miles apart,—our fossil being from the banks of the Nerbudda, and Mr. Dawe's from Nahun, on the banks of the Delhi Canal,—the remains of a race of narrow-toothed fossil elephants.

* All more or less worn.

Notes on Fossil Discoveries in the valley of the Nerbudda. By G. G. SPILSBURY, Esq.

In continuation of my notes on the fossils of the Nerbudda valley, I beg to forward for presentation to the Society another series of drawings from the same able friend's pencil, and without whose cheerfully accorded aid, I should have little chance of being either intelligible or interesting.

A. is a set of six specimens drawn to the same scale.

No. 1. I had set down as that of the humerus of a buffalo, but am doubtful, from its answering almost completely in dimensions to a similar bone delineated in Captain Beechey's voyage as that of the Musk Ox; and to shew the great resemblance, G is the reverse drawing of No. 1 for comparison with Captain Beechey's, made to his scale and delineation.

No. 2. Is a portion of the femur of a similar animal.

No. 3. Portion of femur of elephant.

No. 4. Tooth of hippopotamus.

No. 5. Part of lower jaw of an elephant.

No. 6. Sacrum with last lumbar vertebra of some bovine animal.

B. No. 7. Lower jaw of a wild hog, and C. No. 7. in the next plate, is a somewhat different view of the same specimen.

No. 8. Part of the lower jaw, tusks, and teeth, imperfect, of the hippopotamus.

D. No. 9. Dexter half of the lower jaw of an animal of the deer kind.

No. 10. Portion of upper jaw and teeth of a deer.

E. Posterior molars of a hippopotamus.

F. Two drawings, frontal *a*, and occipital *b*, of a horned animal remarkable for the little depth of the skull, from the point at *b* to the condyles of the occiput being scarcely two inches; *c d* are reversed views of the chin of the hippopotamus; the original of which has been forwarded for presentation to the Museum, accompanied by seventeen other specimens.

Of the various sites and localities from which the foregoing have been derived, a few remarks may be necessary. They occupy a space (generally on the banks of the Nerbudda) from some miles above Jubbulpore down to Brimhan-ghat, a distance of at least eighty miles by

the course of the river. The specimens of hippopotamus have chiefly been from the vicinity of Deo Pachur, from whence the huge specimens of the elephant, now in the Museum, were sent in November 1833, and an account published in the Journal of the Society, for August 1834. In addition to these, some few traces of turtle have been brought in, but no specimen of any carnivorous animal has as yet been found among the numerous graminiferous classes.

Camp, Gov. Genl. Agent at Rewah,
14th February, 1840.

Remarks by DR. T. R. ROTH.

Calcutta, January 18, 1841.

Returning to you with many thanks the drawings of fossil bones which you had the kindness to communicate to me, I embrace this opportunity to draw your attention on that figure which is marked B. No. 8, and by the learned gentleman who did send it, supposed to be the lower jaw of an hippopotamus. I own I was myself in the first time led to the same opinion by the very singular shape and breadth of the whole, and the situation of the tusks; but when I counted the teeth, and found 3. 1. 7, and much more, when I observed the small distance of the first molar from the tusk, and the shape of the last molar, I was not more at a loss; for all that shews me, that I have before me the jaw of a species of *Palæotherium*, which will very likely prove to be a new one, because it differs from all species known till now, by the obtuseness and breadth from one tusk to the other. I would suggest that you should induce your correspondent to send either more detailed drawings, or the specimen itself if possible, for further examination.

Fig. *a* and *b* I consider myself as a most extraordinary skull. The proportion of the margo orbitalis externus (posterior) to the tuber frontalis of the horn is like that of the *Bos Grunniens*; but the small height of the skull is very singular, and worth a full and accurate description.

d g and *n* I suppose are remains of two different species of Antelope. *B 7* and *C* of *Sus*. *E* surely of hippopotamus; but whether *A 4* belonged to an individual of the same kind I cannot tell at present.

Let me entreat you, Sir, to prevail with the gentleman, your correspondent, to submit rather the specimen, than drawings; for although, these now before us are beautifully executed, yet they want very much as to supply the specimens themselves.

I am directed by Herrmann de Meyer, Esq. of Frankfort on the Main, author of the "Palæologica," and other valuable geological works to distribute among the geologists of the Honorable Asiatic Society of Bengal, the prospectus of a new intended work, "Fauna der Vorwelt" (Faune of the former age.) The name of the author will be sufficient to shew what is to be expected by his genius and able pencil.

NOTE.—This prospectus is printed with this No. as an advertisement, and will continue so to appear till further notice.



Catalogue of the Birds in the Museum of the Asiatic Society. By
J. T. PEARSON, Surgeon, formerly Curator of the Museum.

NOTE.—I cannot omit this opportunity of thanking Mr. C. W. Smith, for the kindness with which he has lent me his Notes, to which I am so largely indebted in the following Catalogue.

J. T. P.

No. 1.

Class AVES.

Order RAPTORES.

Fam. FALCONIDÆ.

Genus HALIÆTUS.

Sp. *H. Leucogaster*.

White bellied Eagle.

A specimen sent from the Chinese collection lately broken up at Macao: a portion of which, consisting of the animals mentioned in this and other branches of the Catalogue, was sent to the Museum of the Asiatic Society by Mr. Inglis.

2. *Haliæetus Ponticerianus*.—Pondicherry Eagle.

Shot by the Curator, near Calcutta, and mounted in the Museum.

Falco Ponticerianus.—Gmelin's Lin. I. 263 Turton's Lin. I. 150.

Pondicherry Eagle. Latham's Gen. Hist. I. 147. Shaw's Gen. Zool. VII. 91.

Halieetus Ponticerianus. Stephens' continuation of Shaw's Zool. XIII. Part II. 13.

"Europeans have given this bird the appellation of Brahminy Kite, which originates probably in having observed that the Hindoos attach superstitious ideas to it. Among the Mahommedans there is a prevalent notion, that when two armies are about to engage, the appearance of one of these birds over either party, prognosticates victory to that side; thence its Arabic name of البنقا مسيح

"These birds are among the first objects which attract the eye of a stranger, for they swarm about the shipping at Calcutta, and are useful in removing any offal which may be thrown overboard; but though their usual food is carrion, yet they kill fish, and not unfrequently carry off a snipe which the sportsman has levelled."—*C. W. Smith's MS. Notes.*

The Brahminy Kite is a handsome bird, of an elegant form, and striking plumage; the rich red-brown of the back contrasting well with the white of the head, neck, and breast, the black of the quill feathers, and the yellow beak and legs. As Mr. Smith has stated, it is common at Calcutta; it is met with in the interior of the country, but not so often as at that place. At Garden Reach, the species is often observed in pairs, perching on the stump, or branch of a decayed tree; and numbers of them are to be seen flying over the Hoogly. It is perhaps possible, that there may be something like migration in the habits of this bird. I have thought that at some periods of the year it is more common than at others: in the cold season it abounds, while in the rains, it is rarely met with. Lieut. Montriau, of the Indian Navy, to whom I am indebted for much information on Indian Zoology, informs me, that it is rarely seen at Saugor in the cold season.

4. GENUS ACCIPITER.

Sp. *A. Fringillarius*.—Sparrow Hawk.

Shot at Garden Reach, and mounted in the Museum.

5. *Accipiter*.—? Chippuck Hawk.

Shot by the Curator at Garden Reach, and mounted in the Museum.

This bird is called *Chippuck* by the natives.

6. Gen. *IERAX*.Sp. *Ierax*.—Cohy Falcon.

Chinese collection *Cohy Falcon*, Lath. Gen. Hist.

"This is a scarce bird, it was sent to me by a native gentleman residing at Thekaree in the Gya district, who accompanied it by a note, in which he acquainted me, that a bird of the species had not been procured more than once in the memory of the oldest *shikaree*; and that it was thought to be a most auspicious circumstance to find one on the estate. This is the Cohy Falcon of Latham, whose figure of it is execrable, and it there appears any thing but a beautiful species. I observe that the chesnut plumage on the wings and scapulars of his bird, is not to be found in the present subject."—*C. W. Smith's MS. Notes.*

The Cohy Falcon is one of the most beautiful of the Falcon race; and you perceive at once that it is a high caste bird. Its posture is erect, its plumage glossy, form compact, and manner dauntless: while the crest on the head adds much to its grace and beauty. One was brought to me while at Midnapore, by a *shikaree*, or bird fowler; but I had not the heart to kill it, and after having kept it for some weeks, it broke from its perch and flew away. All my endeavours to procure another specimen were vain. Dr. Evans has one stuffed, and in good plumage, (which that belonging to the Society is not,) and in both these, the chesnut plumage mentioned by Mr. Smith as wanting in his specimen, is present: it may depend upon the sex or age of the specimen. The figure in Latham is certainly a very bad one; and gives no idea of the beautiful bird the Cohy Falcon really is.

7. Fam. STRIGIDÆ.

Genus *STRIX*.Sp. *Flammea*.—Barn Owl.

Presented by P. Homfray, Esq. and mounted in the Museum.

Strix Flammea, Lin. Syst. Nat. I. 133. Turton's Lin. I. 171. Gmelin Lin. I. 293. Shaw's Gen. Zool. VII. 258. Stephens. XIII. 60.

Barn white Owl. Latham's Gen. Hist. I. 355.

Chouette effraie. Dict. Classique D'Hist. Nat. IV. 80.

"I found this bird in the dilapidated ruins about Boodh Gyah, and subsequently other specimens near Hadjipur, Tirhoot. It does not appear to differ from the white Owl of England."—*C. W. Smith's MS. Notes.*

Mr. Homfray's specimen was procured at Howrah.

Dr. Horsfield has named this bird *Strix Javanica*, thinking it different from the European species. And the compiler of the Catalogue of Col. Sykes' collection from the Duckhan, published in the proceedings of the Zoological Society for 1832, page 82, states, that "a comparison of several specimens with the European bird satisfies Col. Sykes, that Dr. Horsfield was right in separating it. Neither sex is unspotted beneath, nor has the Indian species a white disc."

8. Order INSESSORES.

Tribus. FISSIROSTRES.

Fam. MEROPIDÆ.

Genus. MEROPS.

Sp. M. *Viridis*. The green Bee-eater.

Presented and mounted by M. Bouchez. *Merops Viridis*. Syst. Nat, I. 182. Turton's Lin. I. 284. Gmelin Lin. I. 460. Shaw's Gen. Zool. VIII. 156. Stephen's XIII. 73. Latham. Gen. Hist. III. 122.

"These birds are very numerous throughout India, their time of incubation is the month of June, and for months after they are hatched, the whole brood congregate, and swim about with the swiftest and most entire movements through the air, making short dips and returning to the topmost twig, from which they took flight: during these evolutions they are busily employed in snapping up the insects."—*C. W. Smith's MS. Notes.*

The green Bee-eater has the power of gliding along for some distance without closing its wings; so that its flight consists of two parts,—a rapid commencement, in which the wings flap rapidly, and a quick glide, with the wings and tail fully expanded. Its motion, especially in this latter position, is extremely elegant; and its bright, almost metallic plumage, shining in the evening sun, gives one the idea of a very beautiful butterfly rather than of a bird.

9. *Merops Castaneus*. Chesnut Bee-eater.

From the Chinese collection. *Chesnut Bee-eater*, Latham Gen. Hist. 4, 144, *Senegal Bee-eater*. Shaw. Gen. Zool. VIII. 163.

Guepier D'Adanson, Dict. Class. D'Hist. Nat. VII. 579.

10. *Merops*——?——Bee-eater.

From the Chinese collection, perhaps the female of the last specimen.

11. Fam. HIRUNDINIDÆ.

Genus CYPSELUS.

Sp. *C. Palmarum*, the Balearic Swift.

Shot by the Curator, and mounted in the Museum.

Figured in Hardwicke and Gray.

12. Fam. CAPRIMULGIDÆ.

Sp. *C. Asiaticus*.

Bombay Goat-sucker.

From the Chinese collection. *Caprimulgus Asiaticus*, Turton's Lin. I. 636. Shaw. Gen. Zool. X. 156.

Bombay Goat-sucker, Latham. Gen. Hist. VII, 337.

Engoulevent de Bombay, Dict. Class. D'Hist. Nat. VI. 167.

13. Fam. TODIDÆ.

Genus EURYSTOMUS.

Sp. *Eur. Orientalis*. Oriental Eurystomus.

From the Chinese collection. *Coracias Orientalis*, Shaw. Gen. Zool. VII. 403, Latham. Gen. Hist. III. 77.

Colaris Orientalis, Lin. Trans. XIII. 162.

15. Fam. HALCYONIDÆ.

Genus HALCYON.

Sp. *H. Atricapilla*. Black-capped Kingfisher.

From the Chinese collection. *Alcedo Atricapilla*, Gmelin. Syst. Nat. I. 453. Turton. Lin. I. 279. Latham. Gen. Hist. IV. 30. Shaw. Gen. Zool. VIII. 70.

Martin Pêcheur de la Chine. Dict. Class. D'Hist. Nat. X. 227.

Halcyon Atricapillus. Stephens, XIII. 99.

15. *b*. Another specimen from the Chinese collection.

16. *Halcyon Smyrnensis*. Smyrna Kingfisher.

From the Chinese collection.

17. Another specimen presented and mounted by M. Bouchez.

18. Another specimen, shot by the Curator, and mounted in the Museum.

Alcedo Smyrnensis. Lin. Hist. Nat. I. 181. Gmelin. Lin. I. 459. Turton's Lin. I. 282. Shaw's Gen. Zool. VIII. 68. Latham's Gen. Hist. IV. 18. Griffiths' Cuvier, VII. 410.

Martin Pêcheur bleu et roux. Dict. Class. D'Hist. Nat. X. 227.

Halcyon Smyrnensis. Stephens' Shaw's Gen. Zool. XIII. 99.

"This bird is common throughout India, it is likewise possessed of great power, and I recollect a similar feat of courage* displayed by it, which in fact I made the subject of an oil painting. It has a sharp bustling note like the generality of the tribe when taking wing; pursues its finny prey below the surface, and is altogether a brisk lively bird."—*C. W. Smith's MS. Notes*.

The Smyrna King-fisher has been observed by the Curator in Bengal, Behar and Orissa; it is very common at Garden Reach, and indeed in all the neighbourhood of Calcutta.

19. *Halcyon Gurial*. The Gurial King-fisher. Presented by Mr. J. T. Pearson.

20. Another specimen, shot by the Curator, and mounted in the Museum.

Alcedo Gurial. Latham. Gen. Hist. IV. 12.

"This bird is not very common, but is more frequently met with in Bengal than in the other Provinces. It is very strong and powerful, as an instance of which I once observed a contest between one of them and a Hawk of considerable size, in which the Hawk was worsted, and obliged to leave his hold from the effects of a severe blow which the other administered to him on the breast. When wounded, considerable caution is required in handling, for a single blow would disable a person's hand."—*C. W. Smith's MS. Notes*.

As the published descriptions of the Gurial King-fisher are meagre, the following is here inserted. It was drawn up immediately after the death of the only specimen the Curator met with at Midnapore, during a four years' residence there. It is common near Calcutta.

* See Note to No. 20.

Olive brown and green King-fisher with red bill.

Weight $7\frac{1}{3}$ ounces.

Size that of a common pigeon.

Length, from the tip of the bill to the rump $11\frac{1}{2}$ inches, ditto from the tip of the bill to the tip of the tail 16 inches, ditto from ditto to the mid-claw $13\frac{1}{3}$ inches.

Ditto from the base of the bill to the rump $8\frac{1}{2}$ inches, breadth from tip to tip of the wings 22 inches.

Bill long and pointed; flat, like all the Halcyons, at the top, from the tip to the insertion of the fore-head 3 inches long, to the gape $3\frac{1}{2}$ inches; circumference at the base $3\frac{6}{10}$ inches, do. in the centre $1\frac{6}{10}$ inches, colour bright red with black tip. Margin of the eye-lids bare, red under eye-lid, furnished with a row of dingy olive brown feathers near the margin, and below buff coloured; iris dark red. Legs and feet bright scarlet. Head, cheeks, and upper two-thirds of the back of the neck dark olive brown; throat pale straw colour, almost white; breast, neck, and lower third of the back of the neck buff, with the tip of each feather bounded by a narrow margin of the same olive brown colour as the head, forming dotted crescent-like lines; breast, belly, inner wing coverts, thighs, and vent of a bright orange buff, upon a lighter ground; upper part of the neck, scapular, and lesser wing coverts dark brownish green; greater wing coverts, quills, sides of the lower part of the back, upper tail coverts, and tail, dark greenish blue; back from the shoulders to the rump bright azure with silky feathers, shining like satin; false wing of three feathers; quills blue on the outer side, and in the secondary a little blue towards the tips in the inner side, with black shafts, and inner web of the latter edged for two-thirds from the base with dirty white.

The Gurial King-fisher has a laughing screaming note. It is the largest Indian species known to the Curator. In the neighbourhood of Calcutta it is common, and probably in the whole Delta of the Ganges, or Sunderbunds, and Dr. M'Clelland brought specimens from Assam. Its flight consists of short quick jerks, very vigorous, and long continued. In fishing it does not hover; but perches upon the high bamboo bush, or on a middle-sized tree over a pool, waiting for its prey, where its blood-red bill shines brightly in the sun, and its great size, and violent plunge into the water, give one the idea of a noble bird.

21. *Halcyon Amauropterus*. Mihi. Brown winged King-fisher.

This bird appears to be undescribed, and indeed hitherto unknown. It has been named as above by the Curator; and the following is its description:—

Large fawn coloured King-fisher, with brown wings and tail.—Length from tip of bill to the end of the tail 14 inches, breadth from tip to tip of the wings 16 inches, length of bill $3\frac{1}{4}$ inches. Bill and feet scarlet. Head, neck, belly and neck fawn coloured or buff, each feather tipped with brown. Wings and tail smoke coloured. Back cærulean blue. Iris dark brown.

Found near Calcutta.

22. *Halcyon Collaris*.—Collared King-fisher.

From the Chinese collection.

Alcedo Collaris. Turton's Lin. I. 280. Shaw. Gen. Zool. VIII. 80.

Collared King-fisher. Latham Gen. Hist. IV. 27.

Martin-Pêcheur à collier blanc. Dict. Class. D'Hist. Nat. X. 227.

23. Genus *ALCEDO*.Sp. *A. Rudis*.—Pied King-fisher.

Shot by the Curator, and mounted in the Museum.

Alcedo Rudis. Lin. Syst. Nat. I. 181. Gmelin Lin. I. 454. Turton's Lin. I. 283. Shaw. Gen. Zool. VIII. 63.

Black and white King-fisher. Latham. Gen. Hist. IV. 15.

Martin Pêcheur Pie. Dict. Class. D'Hist. Nat. X. 231.

“This species is very numerous; there is not a river, stream or pool without its complement of these birds, where they may be seen constantly on the look-out, hovering like this tribe, and anon plunging beneath the water in pursuit of their prey.”—*C. W. Smith's MS. Notes*.

The Pied King-fisher is not so common in the neighbourhood of Calcutta as in Behar and Orissa. At Midnapore it is very common, and forms a striking feature in the picture of nature, as it hovers in the beauty of its glossy black and white, satin-like plumage, over the streams. From a height of 20 or 30 feet it plunges down dead as a stone into the water, and remains below it so long, that the ripple over the surface clears away sometimes before it comes up again.

The Pied King-fisher is a very beautiful bird; its plumage being smooth, snowy white, and jet black, in patches of irregular size and

shape, shining like satin, and lying very close. On the top and back of the head the feathers are loose, and somewhat lengthened into a plume.

24. Another specimen from the Chinese collection.

25. *Alcedo Bengalensis*.—Indian King-fisher.

Shot by the Curator, mounted in the Museum.

Alcedo Bengalensis, Gmelin. Syst. Nat. I. 450. Turton Lin. I. 277. Shaw. Gen. Zool. VIII. 102.

Indian King-fisher, Latham. Gen. Hist. IV. 43. Griffith's Cuvier, VII. 409.

Martin Pecheur du Bengale, Dict. Class. D'Hist. Nat. VII. 409.

"This species is pretty common, and much resembles the British King-fisher in its motions, rapidity of flight, and note."—*C. W. Smith's MS. Notes*.

The Bengal King-fisher is very common in the neighbourhood of Calcutta. It is frequently seen seated on a stick standing upright in a paddy field, watching for small fishes in the shallow water, when its red breast shining in the morning sun seems like a living ruby.

26. Genus CEYX.

Sp. *C. Azurea*.—The Azure King-fisher.

From the Chinese collection.

Alcedo Tribachys. Shaw. Gen. Zool. VIII. 105.

Azure King-fisher. Latham. Gen. Hist. IV. 61.

Ceyx Azurea. Stephens' Shaw's Gen. Zool. XIII. 106.

27. Trib. DENTIROSTRES.

Fam. MUSCICAPIDÆ.

Genus MUSCIPETA.

Sp. *M. Flaviventris*.—Yellow bellied Fly-catcher.

Muscipeta Flaviventris, Griffith's Cuvier, VI. 334.

28. Genus MUSCICAPA.

Sp. *M. Azurea*.—Azure Fly-catcher.

Celestial Fly-catcher. Latham Gen. Hist. VI. 201.

Muscicapa Azurea. Stephens' Shaw's Zool. XIII. 116. Griffith's Cuvier, VI. 341.

29. *Muscicapa Flammea*.—Flameous Fly-catcher.

Shot by the Curator, and mounted in the Museum.

Muscicapa Flammea. Shaw. Gen. Zool. X. 372.

Flammeous Fly-catcher. Latham Gen. Hist. VI. 173.

Muscipeta Flammea. Zool. Proceedings, 1832, p. 85.

"I met with this bird in a grove of trees near Gyah, there were a pair of them, the female merely differing in the plumage being less bright."—*C. W. Smith's MS. Notes*.

The specimens in the Museum were shot at Garden Reach in the beginning of the year 1836, when a flight of them settled in some lofty larch trees. The morning was foggy, and none were seen during a space of two months afterwards. A specimen was brought to the Curator at Midnapore. He has also seen them at Juanpore, and they are not uncommon at Darjeeling. The female is yellow where the male is red.

29. Another specimen of the Flammeous Fly-catcher. *See Note above*.

30. *Muscicapa Cærulea*.—The Cærulean Fly-catcher.

Shot by the Curator, and mounted in the Museum.

Muscicapa Cærulea. Gmelin. Lin. Syst. Nat. I. 943. Turton's Lin.

I. 579. Stephens' Shaws' Gen. Zool. X. 383 Griffith's Cuvier, VI. 341.

Azure Fly-catcher. Latham Gen. Hist. VI. 180.

Gobe-mouche Azur. Dict. Class. D'Hist. Nat. VII. 401.

The Cærulean Fly-catcher is a native of Bengal. It is common at Garden Reach and its vicinity, where it is to be seen in the lower branches of the mangoe trees, from whence it now and then takes a short flight in pursuit of insects, returning again immediately to the same tree.

31. *Muscicapa* ———. Broad-tailed Fly-catcher.

Shot by the Curator, and mounted in the Museum.

Broad-tailed Fly-catcher. Latham. Gen. Hist. VI. 178.

The broad-tailed Fly-catcher is met with at Garden Reach, near Calcutta. Its habits are much the same as those of the Cærulean Fly-catcher.

31. *Muscicapa Verditer*. Verditer Fly-catcher.

Shot by the Curator, and mounted in the Museum.

Verditer Fly-catcher. Latham. Gen. Hist. VI. 182.

The Verditer Fly-catcher is found in the neighbourhood of Calcutta, but it is not very common. The Curator has not seen it any where else.

32. *Muscicapa* ——. Fly-catcher.

Chinese collection

33. Fam. LANIADÆ.

Genus TYRANNUS.

Sp. *Tyr. Leucogaster*. Tyrant Shrike.

Lanius Tyrannus. Lin. Syst. Nat. I. 136. Gmelin. Lin. I. 302.

Turton's Lin. I. 176. Shaw's Gen. Zool. VII. 304.

34. Genus OCYPTERUS.

Sp. *Ocy. Rufiventer*. Red-bellied Ocypterus.

Presented and mounted by M. Bouchez.

Langrayen a ventre roux. Dict. Class. D'Hist. Nat. IX. 209.

Ocypterus Rufiventer. Griffith's Cuv. VI. 288.

35. *Ocypterus Leucogaster*. White-bellied Ocypterus.

Chinese collection.

Lanius Leucorhynchus. Gmelin's Lin. I. 305. Turton's Lin. I. 178.
Shaw's Gen. Zool. VII. 323.

Artamus Leucorhynchus. Steph. Shaw. Gen. Zool. xii. 137.

Artamus Leucogaster. Griffith's Cuv. VI. 287.

Langrayer a ventre blanc. Dict. Class. D'Hist. Nat. IX. 290.

36. Genus DICRURUS.

Sp. *D*——. Shrike.37. *Dicrurus Indicus*.—Long-tailed Shrike.

Shot by the Curator, and mounted in the Museum.

Drongo Drongolon. Dict. Class. D'Hist. V. 621.

"This species is common throughout India; it is to be seen in every field, is restless, and constantly in motion; and frequently to be seen on the backs of cattle extracting the vermin. It feeds upon insects, is a ferocious and most pugnacious bird, will occasionally kill small birds, with the utmost nonchalance will attack the crow and

kite, which it drives before it as if defeat was a stranger to it. We have therefore no difficulty in the derivation of its vulgar name of the King-crow".—*C. W. Smith's MS. Notes.*

The *Dicrurus Indicus* is one of the most common birds in Bengal. It is to be seen at all seasons mounted on walls, hedges, and the tops of palings, and elevated things of the kind, watching for insects, which it darts upon by a short quick flight, and returns again to its place. In form the King-crow, as it is termed, is very elegant. It is compact and well proportioned, and greatly ornamented by the rich glossy black of its plumage, and the graceful outward curve of either side of its long forked tail. In manner it is lively and bold, but not familiar. And altogether, the King-crow is one of the most striking, and most pleasing objects of Indian animated nature.

38 — . Chinese collection.

39. Genus LANIUS.

Sp. *L. Italicus*.—Italian Shrike.

40. *Lanius Rufescens*.

41. *Lanius Curcutti*. Corcutti Shrike.

Shot by the Curator, and mounted in the Museum.

42. *Lanius* — .

Chinese collection.

43. *Lanius* — .

Chinese collection.

44. Fam. MERULIDÆ.

Genus PITTA.

Sp. *P. Bengalensis*.—Bengal Pitta.

Presented by Lieut. Vickery, and mounted in the Museum.

45. *Pitta Erythrogastra*.—Red-bellied Pitta.

Chinese collection.

Pitta Erythrogastra.—Stephens' Shaw's Gen. Zool. XIII. 185.

46. *Pitta* ——— . Chesnut-crowned Pitta.

Presented by Dr. McCosh, and mounted in the Museum.

This specimen was procured by Dr. McCosh in Assam. It apparently differs from any hitherto described species.

47. Genus *Ixos*.Sp. *I. Jocosus*.

Pink-eared Bulbul.—Jocose Shrike.

Lanius Jocosus. Lin. Syst. Nat. I. 138. Gmelin. Lin. I. 310. Turton's Lin. I. 181.

Jocose Shrike, Lath. Gen. Hist. II. 41.

Lanius Emerica. Shaw Gen. Zool. VII. 332.

Brachypus (?) *Jocosus*. Steph. Shaw, XII. 191.

“These birds are in great request among the natives, being of a fearless disposition, and easily reclaimed. They are taught to sit on the fist, and numbers may thus be seen in any Indian bazar. They have a pretty smart appearance, and the head has an uncommon and handsome plume; but the song, though the few notes of which it is composed are sweet, has neither much strength nor any variety.”—*C. W. Smith's MS. Notes*.

The ear of this bird is clothed with pink feathers, from which character the Curator has ventured to add the English name given above, as, at least, quite as expressive as those it has before. The species is found in great numbers near Calcutta, congregating together on the tops of high bushes, and in middle sized trees. It is also to be met with in Behar and Orissa, and Col. Sykes found it in the Deccan only in the lofty woods of the Ghauts. It is called Bulbul by the natives of India. A good account of its habits is given in Latham's General History of Birds, vol. ii, page 41.

The plumage of the pink-eared Bulbul is glossy in the black and white parts, and the long narrow feathers of the plume are very soft and beautiful, though not silky.

48. *Ixos* ——. Common Bulbul.

Shot by the Curator, and mounted in the Museum.

This is the largest of the two Bengal Bubbuls, and is the variety of Latham's Jocose Shrikes. It is found in great numbers congregating together upon trees and bushes throughout all the parts of the provinces of Bengal, Behar, and Orissa; and I believe in all parts of India. It is a noisy chattering bird, with a whistle like one of the lower notes of the English Blackbird.

"In a state of nature the song of this bird is rather contemptible, but when reclaimed and placed near to better songsters, it greatly improves. This species is very common, and there are several varieties, one of which has a small patch of scarlet on the lesser coverts. It is, however, the Cashmere Bulbul, which is so highly prized, and is generally esteemed the most melodious songster in India."—*C. W. Smith's MS. Notes.*

49. *Ixos* —.

Chinese collection.

50. Genus *ORIOIUS*.

Sp. *Oriolus Chinensis*.—Chinese Oriole.

Chinese collection.

Oriolus Chinensis. Lin. Syst. Nat. I. 160. Gmelin I. 383.

Cochin China Oriole. Lath. Gen. Hist. III. 139.

Chinese Oriole. Shaw. Gen. Zool. VII. 412.

Oriolus Sinensis, Synop. Griffith's Cuv. VI. 397.

51. *Oriolus Melanocephalus*.—Black-headed Oriole.

Shot by the Curator, and mounted in the Museum.

Oriolus Melanocephalus. Lin. Syst. Nat. I. 160. Gmelin I. 383.

Black-headed Oriole. Lath. Gen. Hist. III. 140. Shaw's Gen. Zool. VII. 411.

"This bird is dispersed throughout India, it frequents groves, and is constantly flying from tree to tree. In the spring its plaintive note resembles one lengthened full toned note on the flute; ushers in the dawn; and resounds from every side. It feeds upon the berries of the Bhur and Popul trees and on insects."—*C. W. Smith's MS. Notes.*

The black-headed Oriole is a very common bird in all parts of Bengal, and Mr. Smith mentions it above as dispersed throughout India; but Col. Sykes saw it only in the neighbourhood of the Ghauts in the Deccan, where its place seems to be filled by the *Oriolus Galbulus*, the golden Oriole of Latham, which is said to be very abundant there. Its monotonous, low-toned, constantly repeated note is a positive pest, excelled only by that of the Koel, (*Eudynamys Orientalis*), or Indian Cuckow.

52.

53. Genus *Turdus*.Sp. *T. Migratorius*.—American Robin.

Presented by Dr. Lea.

Turdus Migratorius. Lin. Syst. Nat. I. 292. Gmelin I. 811. Turton's Lin. I. 492. Shaw's Gen. Zool. X. 276.

Red-breasted Thrush. Lath. Gen. Hist. V. 144.

American Robin. Griff. Synop. Cuv. VI. 383.

The Robin. Wilson's American Ornithol. Edit. 1831, Edin. II 112.

54. *Turdus Saularis*.—Little Indian Pie.

Presented and mounted by M. Bouchez.

Gracula Saularis. Lin. Syst. Nat. I. 165. Gmelin Lin. I. 397. Turton's Lin. I. 240. Shaw's Gen. Zool. VII. 474.

Dial Grakle. Lath. Gen. Hist. III. 165.

Turdus Saularis. Sykes' Catalogue, Zool. Proc. pt. 2. 1832. p. 87.

"This familiar and sociable bird often reminds me of its more beautiful brother the British Red-breast; like to that pretty and amiable visitor, it is seen much about the habitation of man, and has all its smart and quick motions. Its song is also similar, and when domesticated it may be taught to speak."—*C. W. Smith's MS. Notes*.

The Dial is a lively, active little bird, rather like a little magpie, having a bright glossy-like black plumage, with snow-white band on the wings, and under parts of the same. It hops about like a Robin, pertly cocking its tail, and whistling a somewhat similar melody. It is very common in Bengal, in the neighbourhood of Calcutta; but less so in the Mofussil, though I have frequently seen it in the provinces of Behar, Orissa, and Allahabad. The plumage of the female is similarly marked to that of the male; but not so glossy.

55. *Turdus* —.

American collection.

56. *Turdus Surpooee*.—Milh. Surpooee Thrush.

Shot by the Curator, and mounted in the Museum.

I have found this bird only in the neighbourhood of Calcutta, where it is not uncommon. It is generally met with near jheels, hopping about the lower branches of overhanging bushes, or upon the ground.

at the brink of the water. I have named it, as M. Bouchez told me it is called by the natives; and I should have described it had I not been obliged to leave Calcutta; and I have now no specimen to refer to.

57. Genus *SIBIA*, Hodgson.

Sp. *S. Nigriceps* HODGSON.—Black-headed Sibia.

Presented by Mr. Hodgson from Nepaul; and another by Mr. Bruce, who received it from Almorah, whence it was sent to him by Lieut. H. Huddleston, 7th Regt. N. I. It is very common at Darjeeling. Mounted in the Museum.

58. *Sibia Picaoides*.—Hodgson's Picaoid Sibia.

Presented by Mr. Hodgson, from Nepaul. Mounted in the Museum.

59. *Sibia* — ?

Presented by Mr. Bruce, who received it from Lieut. Huddleston at Almorah. Mounted in the Museum.

60. —————

Presented by Mr. Bruce. Also from Almorah. Mounted in the Museum.

61. *Turdus* —.

62. Fam. SYLVIADÆ, Vigors.

Genus SYLVIA, Auct.

Sp. *S. Rubetra*.—Whin Chat.

Chinese collection.

63. *Sylvia* — ?

Chinese collection.

This specimen appears to be allied to, if not a variety of 62.

64. *Sylvia* — ?

Shot by the Curator, and mounted in the Museum. Probably a variety of the above.

65. *Sylvia* — ?

Shot by the Curator at Garden Reach, and mounted in the Museum.

This bird is called Chick-chickee by the natives.

66. *Sylvia* ——?

Chinese collection.

67. *Sylvia* ——?

Presented by Captain Pemberton.

68. *Sylvia* ——?

Chinese collection.

69 *Sylvia* ——?—The Saumer.

70.

71. Genus *MALURUS*, Vieillot.

Sp. *M. Longicaudus*.

Motacilla Longicauda. Gm. Lin. I. 954. Turton Lin. I. 586.

Sylvia Longicauda. Shaw Gen. Zool. X. 756.

Long-tailed Warbler. Lath. Gen. Hist. VII. 119. Griffith's Cuv. VII. 467.

Shot by the Curator, and mounted in the Museum.

Common in the neighbourhood of Calcutta, and where, according to Latham, it is called Toon-toonee. He says, "the nest found among mangoe trees, most commonly in shape of a purse, generally composed of two living leaves attached together by fibres, somewhat in the manner expressed in the *Indian Zoology* as belonging to the Tailor Warbler, though not with so wonderful a construction; the hollow space between the two leaves is lined with cotton by way of nest, and the eggs are three in number, whitish, marked with flesh-coloured spots, in length three-fifths of an inch."

72.

73.

74. Genus *JORA*, Horsfield.

Sp. *J. Scapularis*. Horsf.

Jora Scapularis. Horsf. Lin. Trans. XIII. 152. Stephens' Shaw Zool. XIII. 217.

Shot by the Curator, and mounted in the Museum.

The *Jora Scapularis* is very common in the neighbourhood of Calcutta. It is also to be met with in Orissa.

75.

76. Genus MALURUS.

Sp. ———

Chinese collection.

77. *Malurus Cyaneus*.—Superb Warbler.

Presented by Captain Pemberton.

Motacilla Cyanea. Gm. Lin. I. 991. Turton's Lin. I. 611.*Sylvia Cyanea*. Shaw Zool. X. 754.

Superb Warbler. Lath. Gen. Hist. III. 117. Griffith's Cuv. VI. 468.

Malurus Cyaneus.—Stephens' Shaw's Zool. XIII. 223.

Inhabits the southern parts of New Holland.

78. *Malurus Cyaneus*. Superb Warbler.

Another specimen from the Chinese collection.

79. Genus ANTHUS, Beckstein.

Sp. *A. Agilis*. Sykes, Proc. Zool. Soc. 1832. p. 91.

Shot by the Curator at Garden Reach, and mounted in the Museum.

80. *Anthus Trivialis*.—Pipit Lark.

Shot by the Curator at Garden Reach, and mounted in the Museum.

Alauda Trivialis. Lin. Syst. Nat. I. 288. Gm. Lin. I. 796. Turton's Lin. I. 483. Stephens' Shaw's Zool. XIII. 238.*Alauda Sepiaria*. Shaw's Zool. X. 542.

Pipit Lark. Latham. Gen. Hist. VI. 278.

Field Lark. Griffith's Cuv. VI. 477.

The present specimen was shot in the cold weather. I have not seen it but at that season; and so far it agrees with Latham's remark of its habits in England, that it is rarely seen, except in the winter-months.

81. Fam. PIPRIDÆ.

Genus PARUS. Lin.

SP. *P. Cristatus*.—Crested Titmouse.

Parus Cristatus. Lin. Syst. Nat. I. 340. Gm. Lin. I. 1005. Turton's Lin. I. 622. Shaw's Zool. X. 64 and XIII. 246.

Crested Titmouse. Lath. Gen. Hist. VII. 249. Griffith's Cuv. VII. 121.

82. GENUS *PARDALOTUS*, Vieillot.Sp. *P. Australis*.—New Holland Manakin.

New Holland Manakin. Lath. Gen. Hist. VII. 238.

Pardalotus Australis. Stephens' Shaw's Zool. XIII. 252.

83. Fam. FRINGILLIDÆ.

Genus *RAMPHOCELIS*, Desmarest.Sp. *R. Jacapa*.

Chinese collection.

Tanagra Jacapa. Lin. Sys. Nat. I. 313. Gm. Lin. I. 888.

Red-breasted Tanager. Lath. Gen. Hist. VI. 2. Griffith's Cuv. VI. 317.

Ramphopis Jacapa. Shaw's Zool. X. 439.84. GENUS *ALAUDA*, Auctorum.Sp. *A*.——— Finch Lark.

Shot by the Curator, and mounted in the Museum.

Finch Lark. Lath. Gen. Hist. VI. 307.

I shot the present specimen at Garden Reach, during the cold weather, but Latham states it to be found at Cawnpore in the month of April. I do not find it in any other author. Neither Franklin, Sykes, nor Tickell have mentioned it.

85. —————

Chinese collection.

86. —————

Chinese collection.

87. GENUS *FRINGILLA*, Auctorum.Sp. *F. Cœlebs*.—The Chaffinch.

Chinese collection.

Fringilla Cœlebs. Lin. Syst. Nat. I. 318. Gm. Lin. I. 901.
Turton's Lin. I. 552. Steph. Shaw's Zool. IX. 442. and XIV. 37.

Chaffinch. Lath. Gen. Hist. VI. 57.*The Chaffinch*. Griffith's Cuv. VII. 138.*Gros-bec Pinson*. Dict. Class. D'Histoire Nat. VII. 537.

This specimen may possibly be a native of China, and if so, it has a new locality. Latham says, it is met with on the Coast of Africa, at the Cape of Good Hope, and at Aleppo. I have not seen nor heard of it in India.

88. 89.—Fam. LOXIADÆ.

Genus LOXIA. Ray.

Sp. *Loxia Punctularia*.—Cowry Grosbeak.

Shot by the Curator, and mounted in the Museum.

Loxia Punctularia. Lin. Syst. Nat. I. 302. Gm. Lin. I. 851. Turt. Lin. I. 520. Steph. Shaw's Zool. IX. 330. Griffith's Cuv. VII. 152.

Cowry Grosbeak. Lath. Gen. Hist. V. 247.

Gros-bec Domino. Dict. Class. D'Hist. Nat. VII. 526.

Coccothraustes Punctularia. Stephens' Shaw's Zool. XIV. 87.

The Cowry Grosbeak flies in large flocks, and is to be met with in most parts of Bengal. Like the Amaduvade Finch, there are many varieties.

90. *Loxia Malacca*.—Malacca Grosbeak.

Presented and mounted by M. Bouchez.

Loxia Malacca. Lin. I. 302. Gm. Lin. I. 851. Steph. Shaw's Zool. IX. 332.

Malacca Grosbeak. Lath. Gen. Hist. V. 244. Griffith's Cuv. VII. 152.

Gros-bec Jacobin. Dict. Class. D'Hist. Nat. VII. 530.

90. b. *Loxia Coccothraustes*.—Haw Grosbeak.

Loxia Coccothraustes. Lin. I. 299. Gm. Lin. I. 844. Steph. Shaw's Zool. IX. 236.

Coccothraustes Vulgaris. Steph. Shaw's Zool. XIV. 86.

Haw Grosbeak. Lath. Gen. Hist. V. 211.

Common Grosbeak. Griffith's Cuv. VII. 156.

Gros-bec Commun. Dict. Class. D'Hist. Nat. VII. 524.

91. *Loxia Leucocephala*.—White-headed Grosbeak.

Chinese collection.

Fringilla Leucocephala. Steph. Shaw's Zool. IX. 493.

Spotted-sided Grosbeak. Lath. Gen. Hist. I. 248.

Gros-bec a tete blanche et dos rouge. Dict. Class. D'Hist. Nat. VII. 542.

92. *Loxia Astrilda*. Wax-bill Grosbeak.

Loxia Astrilda. Lin. I. 303. Gm. Lin. I. 852. Turton's Lin. I. 520.

Wax-billed Grosbeak. Lath. V. 257.

Coccothraustes Astrilda. Shaw's Gm. Zool. XIV. 87.

Gros-bee Astrild. Dict. Class. D'Hist. Nat. VII. 520.

93. Fam. STURNIDÆ.

Genus ACRIDOTHERES, (?) Vieillot.

Sp. *A. Varius*?—Pied Grakle.

Chinese collection.

Pied Grakle. Lath. Gen. Hist. III. 169. Shaw's Zool. VII. 464.

94. Genus STURNUS. Lin.

Sp. *S. Vulgaris*.—Common Starling.

Chinese collection.

Sturnus Vulgaris. Lin. I. 290. Gm. Lin. I. 801. Turton's Lin.

I. 487. Steph. Shaw's Zool. X. 483. XIV. 52.

Common Stare. Lath. Gen. Hist. V. 1. Griffith's Cuv. VII. 172.

I have never seen the common Starling in Bengal; but in the cold season 1837-38, a specimen was brought me at Juanpore; in no wise differing, as I thought, from the English bird.

95. *Acridotheres Tristis*.—Common Mynha.

Shot by the Curator, and mounted in the Museum.

Paradisea Tristis. Lin. I. 167. Gm. Lin. I. 401. Turt. Lin. I. 242.

Paradise Grakle. Lath. Gen. Hist. VII. 147. Shaw's Zool. VII. 455.

Acridotheres Tristis. Steph. Shaw. XIV. 57.

"This species is exceedingly numerous, and is generally diffused throughout India, even the sparrow is not more frequent; in its manners it is as noisy, and nearly as familiar; like that bird it not unusually makes its nest in the house thatch, or between the rafters. It is very prolific, and has several broods during the year. A pair made their nest in the beams of my verandah, during the rainy season of 1822, and to my surprise had two successive broods within a very short period of each other; but the vermin was so numerous that I was obliged to have the nest destroyed, and the crevice filled up. It is a brisk lively bird, apt to learn words and to whistle, and withal becomes very attached to its master; so much so, that instances are

known in which it has been allowed to range abroad during the day, with a confidence of its return at night."—*C. W. Smith's MS. Notes.*

The *Acridotheres Tristis* is, as every body knows, one of the merriest birds in India, which has caused some to wonder at the trivial name given by Linnæus. That great naturalist, however, placed it among the Paradise birds, and contrasting its sombre clothing with the brilliant plumage of the rest of that genus, he gave it the name of *Tristis*, not from its disposition, but its raiment. It is the Pastor *Tristis* of Temminck, Franklin, and Sykes. Its locality as given by the older writers, is India and the Philippine Islands. Colonel Franklin found it on the banks of the Ganges, and Colonel Sykes in the Deccan. I myself have seen it wherever I have been, except Darjeeling; it most abounds in Bengal. Beyond doubt it is, as Mr. Smith observes, the commonest bird in India. It was imported into the Island of Bourbon to destroy the grasshoppers, and was found so useful as to be especially protected by the laws. Latham says, it builds twice a year, and at each time lays four blue eggs. The natives of India are almost as fond of it, and tame and pet it as much as they do the Parroquet. They procure the young birds by placing an earthen pot in the fork of a tree, the mouth being put at the side to defend it from the weather, for it to breed in, and take the little ones when rather more than half-fledged. The young bird is taught to speak and whistle, and soon becomes very fond of his master.

96. *Acridotheres Malabaricus*.—Malabar Mynha.

Shot by the Curator at Garden Reach, and mounted in the Museum.

Turdus Malabaricus. Gm. Lin. I. 815. Turt. Lin. I. 496..

Malabar Grakle. Lath. Gen. Hist. III. 151. Shaw's Gen. Zool. VII. 471.

Turdus Malabaricus. Steph. Shaw's Zool. X. 305.

Acridotheres Malabaricus. Steph. Shaw's Zool. XIV. 57.

Latham, on the authority of Dr. Buchanan, thinks this a different species from his Pagoda Grakle, (*Acridotheres Pagodurum*); but I suspect there is some mistake about the matter, the differences between the three birds being such as difference in sex or age would readily account for. Both species (if they are distinct) are found in small

flocks in Bengal, Behar, and Orissa, and are plentiful at Juanpore, near Benares.

97. *Acridotheres* — ?

Shot by the Curator, and mounted in the Museum.

This is the Saat Bhye, or Seven Brothers of the natives, so called from being always found in a company of about that number. As every body knows, it is one of the most chattering, noisiest birds in India, squeaking and hopping about, now on the ground, then upon a tree, the flock being constantly on the move; when one starts, all the rest follow it, one after another, making generally but a short flight of not more than 40 or 50 yards at a time; and when alighted they hold a sort of consultation, hopping and squeaking about all the time, till after a few minutes they move off to another tree, and so on for the greater part of the day, rarely staying for more than half an hour in the same place: they feed on insects. It is common wherever I have been in the plains of India.

98. *Acridotheres Calvus*.—Bald Mynha.

Chinese Collection.

Gracula Calva. Lin. I. 164. Gm. Lin. I. 396. Turt. Lin. I. 240.

Bald Grakle. Shaw's Zool. VII. 461. Lath. Gen. Hist. III. 146.

Acridotheres Calvus. Steph. Shaw's Zool. XIV. 57.

99. Gen. *CRACTICUS*, Vieillot.

C. Chalybeus.—The Green Paradise Bird.

Chines collection.

Paradisaea Viridis. Gm. Lin. I. 402. Turt. Lin. I. 244.

Chalybean Paradise Bird. Shaw's Zool. VII. 504.

Blue-green Paradise Bird. Lath. Gen. Hist. III. 195.

Barita Viridis. Tem. Man. II.

Cracticus Chalybeus.

100. Genus *PICA*, Brisson.

Fam. *CORVIDÆ*.

Sp. *Pica Vagubunda*.—Rufous Magpie.

Shot by the Curator, and mounted in the Museum.

"Its namesake in Europe is proverbial for its noise and restlessness. The present subject possesses a full portion of the above

qualities, added to which a familiarity not quite so innocuous. I have known it enter a covered verandah of a house, and nip off half a dozen young Geraniums; visit a cage of small birds, begin by stealing the grain, and end by killing and eating the birds, and repeating these visits daily till destroyed. Its flight has the same jerk, and its motions the same bustling character as the English Magpie. The egg is a plain greyish white."—*C. W. Smith's MS. Notes.*

101. *Pica Sinensis*.—Chinese Magpie.

Chinese collection.

Coracias Sinensis. Gm. Lin. I. 381. Turt. Lin. I. 229.

Chinese Roller. Lath. Gen. Hist. III. 54.

Specious Jay. Shaw's Gen. Zool. VII. 364.

Pi (?) Sinensis. Steph. Shaw's Zool. XIV. 65.

102. GENUS *GARRULUS*, Brisson.

Sp. *Garrulus Gularis*.—Gular Jay.

103. *Garrulus Cristatus*.—Crested Jay.—Blue Jay.

Corvus Cristatus. Lin. Syst. Nat. I. 157. Gm. Lin. I. 369. Turt. Lin. I. 221.

Blue Jay. Lath. Gen. Hist. III. 55. Shaw's Gen. Zool. VII. 359.

Garrulus Cristatus. Steph. Shaw's Zool. XIV. 66.

104. GENUS *CORACIAS*, Lin.

Sp. *C. Bengalensis*.—Bengal Jay.—Blue Bird.

Shot by the Curator, and mounted in the Museum.

Coracias Bengalensis. Lin. I. 159. Gm. Lin. I. 380. Turt. Lin. I. 320. Stephens' Shaw's Zool. XIV. 71.

Bengal Roller. Lath. Gen. Hist. III. 72.

Indian Roller. Shaw's Gen. Zool. VII. 390.

"Though gifted with so brilliant a plumage, much cannot be said in praise of its shape. Its appearance on the wing is lovely, yet when perched we observe a large head, thick neck, prominent breast, and a pinched body, which is rendered more conspicuous by a long tail. It is a very common bird, is little afraid of man's approach, and is pugnacious, driving away the crow without much effort; it is a very noisy, screaming bird, and in this respect is frequently very troublesome. With the Hindoos it is esteemed sacred; they consider

it propitious if seen upon the day which concludes the Dussorah, or Doorga Pooja festivals, and discharge their matchlocks to put it on the wing. The Birmahs annually send parties to procure the feathers of this bird, and of the painted Kingfisher."—*C. W. Smith's MS. Notes.*

105. Genus CORVUS, Auctorum.

Sp. *C. Dauricus*.—White-breasted Crow.

Corvus Dauricus. Gm. Lin. I. 367. Turt. Lin. I. 219. Stephens' Shaw's Zool. XIV. 69.

White-breasted Crow., Lath. Gen. Hist. III. 17. Shaw's Gen. Zool. VII. 349.

"The Indian Crow is more social and familiar than any of its tribe in Britain; like the sparrow it is every where, on the house top, in the verandah, even venturing to take a snatch at the breakfast table, yet always awake to danger, it is off at a moment's warning."—*C. W. Smith's MS. Notes.*

This bird is very common wherever I have been on the plains of India; but Calcutta seems to be its head-quarters, where it is to be seen at all times of the year, upon the houses, in the fields, and on the shipping in the river. It awakes before day-light on the gun being fired in Fort William, and by its incessant cawing, seems determined that every body else shall awake likewise. Latham's drawing is bad; and the description scarcely agrees with our bird. If this be the "common crow of India" of Col. Sykes' catalogue, it is in his opinion the *Corvus Splendens* of Vieillot: but with which it also does not agree.

106.

Genus PTILONORYNCHUS, Kuhl.

Sp. *P. Violaceus*.

Presented by Captain Pemberton.

107.

Fam. BUCERIDÆ.

Genus BUCEROS, Auctorum.

Sp. *Platyrynchus*.

Flat-crowned Hornbill.

Chinese collection.

108.

Buceros Panayensis.—Panayan Hornbill.

Chinese collection.

Buceros Panayensis Gm. Lin. I. 360. Turt. Lin. I. 214. Steph. Shaw's Zool. XIV. 82.

Furrowed Horn-bill. Shaw's Gen. Zool. VIII. 33.

Panayan Horn-bill. Lath. Gen. Hist. II. 321.

109. *Buceros Homrai*.

Presented by Dr. McCosh.

Mr. Hodgson discovered this magnificent species in Nepaul. Lieutenant Phayre, 7th Regiment Native Infantry, brought me a specimen from Moulemein; and this in the Society's Museum was brought from Assam, by Dr. McCosh. A species of Horn-bill more magnificent than the above is found near Kerseangurry, on the road to Darjeeling, at an elevation of about 3000 feet; the head and neck furnished with long disintegrated feathers, forming a sort of mane, their colour light chesnut, and that of the belly dark chesnut, back and wings glossy black, tail do. with white tip. Bill without a casque. I forbear to say more on this bird, having sent it to Mr. Hodgson of Nepaul for description—a gentleman whose exertions in this branch of Natural History in the Himalayah Mountains, entitle him to a consideration of the kind.

Fam. PSITTACIDÆ.

Genus PSITTACUS, Auctorum.

Sp. *Ps. Erythacus*.—Ash-colored Parrot.

Psittacus Erythacus. Lin. I. 144. Gm. Lin. I. 332.

Psittacus Erythacus. Turt. Lin. I. 197. Steph. Shaw's Zool. XIV. 107.

Ash-colored Parrot. Lath. Gen. Hist. I. 208. Shaw's Zool. VII. 486.

111. *Psittacus Sinensis*.—Green and red Chinese Parrot.

Chinese collection.

Psittacus Sinensis. Gm. Lin. I. 337. Turt. Lin. I. 200. Steph. Shaw's Zool. XIV. 107.

Green and red-sided Chinese Parrot. Lath. Gen. Hist. II. 232.

Red-sided Parrot. Shaw's Zool. VIII. 490.

112. *Psittacus Pendulus*. Mihi.—Pendulous Parrot.

Chinese collection.

As I cannot find that this bird has been described by any author, I have ventured to offer a name for it. The following description and remarks are from Mr. Smith's notes:—

“The length of these little birds, the smallest of the tribe in India, is about five inches. The bill is an orange red, the crown of the head, back of the neck and wings a blueish green; the throat, breast, and belly a light yellowish green; a spot of ultramarine colour on the throat; the lower part of the back and the tail coverts deep scarlet; the tail deep green and pointed; and the legs a light orange.

The present drawing was made from a pair of these birds in the possession of a native at Gyah. They inhabit Bengal, however, and do not appear to be found in the Gyah division, nor so far to the Westward. I have seen cages full of them in Calcutta. They have no note that I ever heard, nor do they speak; they are very tame, and when going to roost, resort to the upper part of the cage, where they hang in the manner that I have placed the upper bird.”—*C. W. Smith's MS. Notes.*

In Mr. Smith's drawing the “upper bird” referred to, is represented as hanging to a bough by its legs, with the wings folded almost close to the side, the tail a little spread, and the head downwards.

113. Genus *NANODES*. Vigors.

Sp. *Nan. Pulchellus*.—Turcosine Parrot.

Chinese collection.

114. *Nanodes Discolor*.—Red-shouldered Parrakeet.

Chinese collection.

Red-shouldered Parrakeet. Shaw's Zool. 466.

115. Genus *PLATYCERCUS*, Vigors.

Sp. *P. Pennantii*.—Pennantian Parrakeet.

Chinese collection.

P. Pennantii. Steph. Shaw's Zool. XIV. 120.

Pennantian Parrakeet. Shaw's Zool. VIII. 410.

116. *Platycercus* —.

Chinese collection.

117. Genus PEZOPORUS, Illiger.

Pez. Formosus.—Ground Parrakeet.

Chinese collection.

Ground Parrakeet. Shaw's Zool. VIII. 454.

118. Genus PALÆORNIS, Vigors.

Pal. Alexandri.—Alexandrine Parrakeet.

Alexandrine Parrakeet. Shaw's Zool. VIII. 423.

Paleornis Alexandri. Zool. Journ. II. 49. Steph. Shaw's Zool. VIII. 123.

119. *Pal. Barrabandi*.

Chinese collection.

120. Genus TRICHOGLOSUS, Vigors.

Sp. *Tr. Hæmatopus*.—Blue-bellied Parrakeet.

Chinese collection.

Blue-bellied Parrakeet. Shaw's Zool. VIII. 413.

121. *Trichoglossus Concinnus*.

Chinese collection.

122, 123, 124. *Trichoglossus Pusillus*.—Small Parrakeet.

Chinese collection.

Small Parrakeet. Shaw's Zool. VIII. 471.

125. Fam. PICIDÆ.

Genus BUCCO, Lin.

Sp. *B. Cyanops*.—Blue-cheeked Barbet.

Shot by the Curator, and mounted in the Museum.

Blue-cheeked Curucui. Shaw's Zool. VII. 7.

The blue-cheeked Barbet is common in Bengal, less so in Orissa, and I have not seen a specimen at Juanpore. Mr. Smith well observes of it, that "It has a singular habit when perched of bowing the head, accompanying each motion with a single note resembling the word 'hoo.' It has two broods, the one in the month of May, the other in November."—*MS. Notes*.

126, 127, 128. *Bucco Indicus*.—Indian Barbet.

The first specimen presented by M. Bouchez. The others shot by the Curator, and mounted in the Museum.

The Indian Barbet is one of the most common birds of India, often congregating in small flocks. One of them is generally perched on the top of the highest tree and nods his head, and cries "buck, buck, buck," every time with the most indefatigable perseverance for hours together. From this cry the generic name was probably taken. It feeds upon seeds, is a social good tempered little fellow, and flies like a lump of a bird, as it is, in short jerks high in the air, though to no great distance at once.

129. Genus *Picus*, Lin.

Sp. *Picus Viridis*.—Green Woodpecker.

Green Woodpecker. Lath. Gen. Hist. III. 345. Steph. Shaw's Zool. IX. 183.

130. *Picus Macei*. Cuv.

Common in most parts of India.

131. *Picus* —.

132. *Picus Erythrocephalus*.

133. *Picus Torquatus*.

Chinese collection.

Lewis's Wood-pecker. Lath. Gen. Hist. III. 376.

Picus Torquatus. Wilson Amer. Orn. I. Steph. Shaw's Zool. XIV. 164.

Is this a young bird of the *P. Torquatus*?

134. *Picus* —.

Chinese collection.

136. *Picus Tiga*.—Tiga Woodpecker.

Picus Tiga. Horsf. Trans. Lin. Soc. XIII. 177.

Tiga Wood-pecker. Lath. Gen. Hist. III. 416.

136. Genus *COLAPTES*, Swainson.

Col. (?) *Rufus*.

Presented by Mr. C. W. Smith, and mounted in the Museum. The specimen was purchased among others in a collection from Java.

137. *Colaptes* —.

Presented by Mr. C. W. Smith, and mounted in the Museum; also in the Java collection.

I cannot find this species in any work, is it new?

138. Fam. CUCULIDÆ.

Genus CUCULUS, Auctorum.

Sp. *C. Edolius*.—Edolio Cuckoo.

Chinese collection.

I shot a specimen on the banks of the Ganges below Rajmahal ; and saw several others. I have never seen it in Bengal or Orissa. It is figured and described in Mr. Smith's notes, but he does not state its locality.

Edolio Cuckoo. Stephens' Shaw's Zool. IX. 114.

Cuculus Edolius. Griff. Cuv. VII. 455.

139. *Cuculus Coromandus*.—Collared Cuckoo.

In the original collection.

Collared Cuckoo. Lath. III. 292.

Cuculus Coromandus. Stephens' Shaw's Zool. XIV. 208. Griffith's Cuv. V. 455.

140. *Cuculus* —.

Presented by Mr. C. W. Smith, from the Java collection.

141, 142. *Cuculus* —. Metallic Cuckoo.

Chinese collection.

This appears to be Latham's Metalline Cuckoo, described in the General History, III. 301.

143. Genus EUDYNAMYS.

Sp. *Eu. Orientalis*.—The Coel.

Shot by the Curator, and mounted in the Museum.

The Coel is common in every part of India. It is to be found in every thick tree, and in the hot weather, is a pest of no ordinary nature; uttering incessantly the cry from whence its name is taken, "coel," "coel," or "cokeel, cokeel," with a liquid intonation of the *l*. It continues this cry, loud enough to be heard several hundred yards, from morning to night; and indeed from night to morning almost, for I have heard it at 10 o'clock at night, and at 2 in the morning. Latham describes this cry as cheerful and pleasant, but had he heard it he would have thought differently; it is melancholy and monotonous, and wearisome to the listener beyond measure. During the day other noises go to drown it, but at night, and especially early in

the morning, it is an absolute evil, by awaking one, when just dropped a sleep from the exhaustion of the hot preceding day, and the still more terrible early part of the night.

144. Genus *CENTROPUS*, Illiger.

Sp. *Ce. Castanopterus*.

Chesnut Coucal. Original collection.

Chesnut Coucal. Lath. Gen. Hist. III. 243.

"This bird is very common throughout India. It is vulgarly called the Crow Pheasant; and has acquired this appellation from a considerable resemblance to the Pheasant in its mode of running, of crouching, and secreting itself in bushes; and from its taking wing in the same bustling way. It feeds upon insects, grubs, and when opportunity occurs upon carrion. This and the two succeeding specimens are usually seen upon the ground, in which they differ from the other numerous members of their tribe, which seldom alight, but make short flights from one tree to another.

Latham gives the appellation of Coucal to this tribe, to distinguish them from the Cuckoos; but referring to their habits, I have called them "Ground Cuckoo," so strongly opposed to the Cuckoos, which never descend from the tree."—*C. W. Smith's MS. Notes*.

145. *Centropus* —.

Original collection.

Besides these specimens of *Centropus*, Mr. Smith has drawn a third, and I have seen a fourth differing from all, but having lost my notes, I am unable to describe it. The name proposed by Mr. Smith of "Ground Cuckoo," is a very appropriate one, and reminds us of the analogy between the Cuckoos and Parrots in this respect, the Genus *Pezoporus* of the latter being analogous to the Genus *Centropus* of the former.

Mr. Smith describes his second species thus: "This bird is nineteen inches in length, and twenty-four in breadth. The bill is a reddish grey, pale at the edges, strong, rather hooked, and in length two inches. The eye is of a pearly hue, defended above by strong lashes, and having a grey skin or orbit edging the lower half. The plumage of the head, breast, neck, and body is a hoary brown, inclining to black on the crown of the head and behind the neck, and marked

throughout with darker bars. The wing coverts are a red brick colour; the scapulars, secondaries, and quills, barred with black. The tail is fan-shaped, black, with small grey bars sloping to a point on the shaft. The legs are black, and the long claw on the inner hind toe rather less elongated than in the preceding specimen."—*Centropus Castanopterus*.

"This species is found in the Gorruckpore district, elsewhere I have not observed it. In its manners and habits it is similar to the common Mohoka, but its shape more comely by far."—*C. W. Smith's MS. Notes*.

"If, as I believe, not already named, I should propose the name of *Cen. Fasciatus*, when its trivial character would stand as follows:—

Cen. Fasciatus, Black Coucal, with brick red wings, barred with black.

Mr. Smith's next species is by far a more interesting bird, as it seems to form the connecting link between the ground and tree *Cuckoos*, partaking of the manners and general appearance of the former, and having the short hind toes of the latter. It will probably form a new genus of *Cuculidæ*; but in the meantime till this be determined, perhaps the name of *Centropus Cuculoides* may be admitted. Mr. Smith describes it as follows:—

"Measures sixteen inches in length. The bill is a bright vermillion slightly edged with yellow, and has a black spot about the centre of the edge of the upper mandible; there is a singular streak of minute white feathers forming a line from the nostril to the lower part of the eye: the latter is a dark brown, surrounded by white lashes. The plumage upon the crown of the head, the hinder part of the neck, the back, and wings, is a brownish satin colour, with black shafts; that on the throat, breast, and belly a faint orange, similarly marked; that of the tail dark grey, the two central ones wholly so, the next have white tips. The legs are slate coloured; and there is not the long claw remarked in the hinder toe of the preceding birds."

"I met with this species at the Bherah lake, in the Gorruckpore district, where it appeared to be pretty common, but I have not seen it elsewhere. It greatly resembled the Mohoka in its manner of running and flying. The natives, who delight in extraordinary stories, affirm, that it proclaims the morning, eve, and midnight hour by a pecu-

liar note; unfortunately I never happened to hear such a timed note."
—*C. W. Smith's MS. Notes.*

Ornithological works being procurable with difficulty in India, I have chosen the most common for the few synonyms I have thought it necessary to give.—J. T. P.

CATALOGUE OF MAMMALIA

In the Museum of the Asiatic Society. By J. T. PEARSON, Surgeon, Bengal Establishment; formerly Curator of the Museum.

NOTE.—This very meagre list contains only the few specimens of Mammalia that were in the Museum before I became Curator; that of the additions made during the time I held the office was unfortunately lost in the Ganges; and I have no copy.—J. T. P.

1. CLASS. MAMMALIA.

Ord. BIMANA.

Genus HOMO.

Sp. *Homo Sapiens*.—Man.

A mummied Head.

Presented by Lieut. Archbold, who procured it in the catacombs of Egypt.

2, 3, 4, 5. Ord. QUADRU MANA.

Genus SIMIA.

Sp. *Simia Gigantica*.—The gigantic Ape.

The skin of the face and left fore and hinder hands, and part of the skin.

Presented by Captain Cornfoot, who procured this specimen in the Island of Sumatra. The animal is described by Dr. Abel in the 13th Volume of the Researches of the Asiatic Society.

6. GENUS SEMNOPITHECUS.

Sp. *Semnopithecus Melalophos*.—The Simpai.

A stuffed specimen.

The Simpai is described by Sir T. Raffles in the 13th volume of the Linnæan Transactions; and as far as can be made out (from its bad state) the present specimen agrees with his description.

7. Ord. CARNASSIERS.

Fam. CHEIROPTERA. Trib. VESPERTILIONES.

Genus PTEROPUS.

Sp. *Pteropus Edulis*.

The black Pteropus, or eatable Bat.

A stuffed specimen.

8.

Genus GALEOPITHECUS.

Sp. *Galeopithecus Rufus*.—The Colugo.

A stuffed specimen.

9.

Fam. INSECTIVORA.

Genus SOREX.

Sp. *S. Indicus*.—The Indian Shrew.

A stuffed specimen.

10.

Fam. CARNIVORA.

Trib. PLANTIGRADÆ.

Genus ICTIDES.

Sp. *Ictides Ater*.

Presented by Colonel Farquhar.

Mr. Wardlaw in the second volume of the Journal of the Asiatic Society, has given very satisfactory reasons for identifying this specimen with the *Ictides Ater* of F. Cuvier.

11. Trib. DIGITIGRADA.

Genus FELIS.

Sp. *Felis Kutas*.—The Kutas.

A mounted specimen.

Presented by Mr. J. T. Pearson. This animal is described by the donor in the 1st volume of the Journal of the Asiatic Society.

12. Fam. MARSUPIATA.

Genus THYLACYNUS.

Sp. *Thylacinus Cynocephalus*.—Part of the skin.

13. Ord. RODENTIA.

Genus RHIZOMYS, Gray.

Sp. *Rhizomys Sumatrensis*.

A mounted specimen.

Described by Sir T. Raffles in the 13th vol. of the Trans. of the Linnæan Society.

14. Genus HYSTRIX.

Sp. *Hystrix Fasciculata*.—Pencilated Porcupine.

A mounted specimen.

15. Ord. EDENTATA.

Genus MANIS.

Sp. *Manis Crassicaudata*.—The short-tailed Manis, or Pangolin.

A mounted specimen.

16. Sp. *Manis Crassicaudata*.—The short-tailed Pangolin.

A mounted specimen.

A good deal smaller than the last.

17. Ord. EDENTATA.

Sect. MONOTREMA.

Genus ECHIDNA.

Sp. *Echidna Hystrix*.—The Porcupine Ornithorynchus.

A mounted specimen.

18. Ord. RUMINANTIA.

Trib. CERVIDÆ.

Genus MOSCHUS.

Sp. *Moschus Javanicus*.—The Kanchil.

A mounted specimen.

18. Sp. *Mochus Javanicus*.—The Kanchil.

Another mounted specimen.

19. Trib. CAPRIDÆ.

Genus ANTELOPE.

Sp. *Antelope Thár*.—Native of Nepaul.

A mounted specimen.

Described in the Journal of the Asiatic Society, vol. iv. p. 489, by Mr. Hodgson of Nepaul.

20. Sp. *Antelope Thár*.—The Thar Antelope.

A stuffed Head and Neck.

21. Trib. BOVIDÆ.

Genus Bos.

Sp. *Bos Taurus*.—The Cow.

A mounted specimen.

A double-headed Calf, presented by ———

22. Sp. *Bos Bubalus*.—The Buffaloe.

A mounted specimen.

A double-headed Calf, presented by Major Gall and Mr. Sewell.

23.

Ord. CETACEA.

Fam. CETÆ.

Genus DELPHINUS.

Sp. *Delphinus Gangeticus*. The Gangetic Dolphin.

A mounted specimen, presented by Mons. DUVAUGEL.

The *Delphinus Gangeticus* seems to have been formed into a new genus: it is called the *Plantanistes Gangeticus* by Hardwicke and Gray, as has been before mentioned in the Osteological section of the Catalogue.

NOTE.—Owing to inadvertence, the Catalogue of Mammalia has been misplaced in its order of succession by the printer: it should have preceded the Ornithological Catalogue.



Inscription taken from a Baolee at Bussuntgurh at the foot of the Southern range of Hills running parallel to Mount Aboo. By T. S. BURT, F. R. S. Captain, Bengal Engineers.

The indefatigable research, and unabated zeal of Capt. Burt, has put me in possession in this Inscription from Bussuntgurh, of some new and curious information regarding the early dynasties of the Ranas of Mewar. Descended, as my readers need not be reminded, from the *Balhara* monarchs of *Saurashtra* (Surat and Guzerat,) the family destined to fix its seat of power at Chitore and Odeypore, sojourned for two hundred years in the Bhauder Desert after the destruction of that monarchy, until (Useful Tables, p. 109) "*Baph*, or *Bappa* conquered Chitore, and founded a new dynasty in A. D. 727." The list of titular potentates who headed the Gehlote or Jesodia tribe during the above period, from A. D. 524, when the Parthians destroyed the capital Balabhi in Sourashtra, to the date above noted, A. D. 727, is given by Tod from the *A'spur* marble (Rajasthan, vol.—p.—,) and he traces the succession of their princes from the *Aitpur* Inscription, after their conquest of Chitore in the following order :—

	<i>Wilson's List.</i>	<i>Tod's List.</i>
A. D. 750.	Guhila,	1. Sri Gohadit.
	Bhoja,	2. Bhoja (Bhagaditya.)
		3. Mahendra.
		4. Naga (Nagaditya.)
		5. Jyela.
		6. Aprajit.
		7. Mahendra.
	Kalabhaja,	8. Kalabhaja.
	Bhartribhata,	9. KHOMAN (invasion of Chitore from Cabul, A. D. 812.)
	Samahagika,	Mangal, expelled by chiefs.
	KHUMAN,	10. Bhirtipad, (founded thirteen principalities for his sons in Malwa and Guzerat.)
		11. Singhji, whose Ranee Lukshmi bore
	Allata,	12. Sri Allat, whose daughter Haria Devi was grand-mother of
	Naravahana,	13. Nirvahana.
		14. Salvahana.
967.	Saktivarma,	15. Saktikumar, 967 or 1,068?

I have given these lists at length for facility of reference with respect to the suggested classification of the monarchs before inserting the Inscription itself. It bears date Samvat 1,099, or A. D. 1,042. The character is fairly cut, and in high preservation in the ordinary letter of the period. The reading by Pundit Kamalakanta Vidyalanka is printed as usual in common Nagree to accompany the Translation.

My readers will observe, that in the genealogical lists above given of the ancestors of both Lahin and Vighraha, we find names entirely new to us as reigning monarchs in Mewar. In one or two only do we see coincidence or even resemblance with those of Tod's list, which Chronology will allow us to admit as identical with some names in our Inscription. The names of the countries, *Badari* the kingdom of Raja Sangna, and *Vada*, the residence of Poorna Pala, are new to us, and none of the Pundits whom I took much pains to consult were enabled to give me references sufficing to elucidate the difficulty; under the impression however, that they might by possibility be names of purely local application to tracts long unknown, as the sites of power, or the habitat of a numerous population, I begged Capt. Burt to oblige me by detailing, to the best of his remembrance, any circumstances attending his discovery of the Inscription, which might aid conjecture in coming to a satisfactory conclusion.

"The Bussuntgurrh Inscription was taken from a deep tank or baolee of moderate dimensions, almost entirely surrounded with jungle, and lying at the foot of that portion of (what Tod calls, as I understand him,) the Aravulli range of hills, situated nearly *opposite* the northern extremity of the mountain Aboo. The country contained between these two heights is, I think, and as far as Beejagnoh (Beejipoor by Tod, "the city of victory,") called Badari; for I think one of the Sawars, (belonging to the Kawul of Sirohee,) who attended me during my pilgrimage, gave it that name, in contradistinction to that of the country lying on the other, or western side of Aboo, and stretching out to Neebach, or Neemuch, (not our cantonment of course) but a dependency I believe of the Sirohee Raj. In the first mentioned, the country is covered with jungle, and in the latter *comparatively* open, that is, after clearing out a few miles from the base of the mount, which is entirely surrounded by forest trees, as well as almost impenetrable grass, rendering a descent from Aboo a dangerous operation at the end of the rains, (being once there,) on account of the malaria generated by the evolution of mephitic gas from the rife vegetation there, and similar to that of the Terai below Nipal, and the forests between this and Bombay."

Here then we have *Badari* recognised as the modern local appellation of the tract of country near about the site of the Inscription. As to attempt-

ing to trace with accuracy the genealogy now before us in that of the line of princes whom we can already number with certainty as among the rulers of Mewar, I own that at present, without other sources to refer to, the effort does not seem likely to be attended with success. I did not fail to consult my friend, Lieut. Cunningham, (Bengal Engineers,) than whom I know no one more capable of giving a sound opinion upon a case of historical or chronological difficulty. Without going into the detail of a very ingenious calculation, (which I prefer keeping back until the contents of another Inscription be fully ascertained, which I hope may throw light upon that of Bussuntgurh,) I will merely state two of Lieut. Cunningham's positions, as being both exceedingly well founded. "Bhiritripad," he observes, "founded thirteen principalities for his sons, and I am inclined to suppose your new dynasty to be one of the branches of his family." The same idea occurred, I must own to myself, on first studying the genealogy, and evidence of the existence of petty states, "the land of *Badari*," and "the city of *Vada*," which we find recorded in an age immediately succeeding Bhiritripad's in the Bussuntgurh Inscription, A. D. 1,042, proves the correctness of the information we have, and gives a natural idea of the state of the country, after the attack of Chitore, A. D. 812, in the reign of Khoman, when after the expulsion of the temporary sovereign *Mongal*, the next successor found himself compelled to subdivide his authority, weakened by the anarchy and confusion of the twenty years preceding.

Lieut. Cunningham again accounts for the want of agreement between the names on the Bussuntgurh Inscription and those recorded in the "Useful Tables," by pointing out that "the Rajas in James Prinsep's list, (after Sri Allat) are descended on the female side, whereas in the Inscription they would appear to be heirs male." I would not readily hazard a conjecture where further researches for the evidence of Inscriptions is almost certain to be productive of fact established on the surest grounds. One can only hope that those who have the opportunity will not allow it to escape them, when at a slight expense of exertion, the ancient history of one of the most interesting portions of India may be by their efforts, as so often by Capt. Burt's, greatly elucidated.



Literal Translation.

1. I, Matri Sarmá, a poet and the son of Hari, having offered salutations to Váni, (the goddess of wisdom,) who is propitious to the learned, made this eulogy.

2. May Hari, the illuminator of the three regions, who is himself the sun (or the only object of speculation to the astronomers) Sivá to

Saivas (or the followers of Sívá,) to be known by intuition and meditation, remover of sins, illustrator (creator) of all, great, knowing all human virtuous dispositions, and surrounded by the *Vasoo*s, *Kinnaras*, and *Sidhas*, and whose divine truth is unveiled to the wise,—protect you!

3. From the wrath of *Vasisthá** was born a son * * * * * and from him sprang many powerful *Rajas*.

4. From *Utpala Raja*, one of the descendants of this line, sprung one named *Aranya Raja*, and from him was born *Adbhūta Krishna Raja*, who was renowned like *Vasudeva*, (*Krishna*).

5. His son, who was famous, noble, and whose name was *Srínáth Ghosi*, had also a son named *Mohípála*, from him was born *Raja Vandhuka*.

6. Whose fame is still to be sung aloud even in the region of the gods, by the well-dressed and adorned goddesses, as well as by the females of the *Kinnaras*, having lutes in their hands.

7. He by his might easily carried off the *Lakshmi*, (Fortune,) of his enemies, though they assembled a numerous army. His beautiful wife, whose name was *Ghreta Devi*, was of a mild disposition and a noble family.

8. From her and *Vandhuka* was born *Púrnapála*, who was always content, famous, and the supporter of all; who also acquired the name *Valadarpada*, for his having fought battles and possessed kingdoms of (his enemies.)

9. His fame in the assembly of *Indra*,† is always sung by the god-

* Note by Pundit Kamalakanta on the sloca 3 of the above. "From the wrath of *Vasistha*."

The following sloka are extracted from the 13th section of the 9th chapter of *Srímát Bhágvat* :—

Nini, the son of *Ikohákú*, having commenced a *jagna*, (a secret ceremony), wished to acknowledge *Vasistha* as his priest for its performance, who instead of complying with his request, said that he has, prior his petition, been bound to perform the ceremony commenced also by *Sakra*.

And further that he must wait till the same was over.

But *Nini* being sensible of the instability of worldly pursuits, determined to have it (the ceremony) performed by another priest.

Whereupon *Vasistha* on his return (from the kingdom of *Sakra*) found *Nini* to have broken his promise, cursed him to loose his life.

From the dead body of *Nini*, which was thus separated from life and (afterwards) churned by the gods, was born a son. * * * *

† The chief of the gods.

desses, who are all beautifully adorned with the golden flowered ornaments and with lutes in hands resplendent with jewels.

10. He (Púrna Pála) placed at the gate of his palace the strong elephants exuding ichor from their temples, of his enemies, whom he has easily slaughtered in several battles. To him, who was the illuminator of the Pála line, and most eminent within the whole Arryaváta, the *Srí Lakshmi* was, as it were, the governing queen.

11. His younger sister named "the queen *Láhiní*," who was as it were the *Lakshmi* herself, but without the seat of lotus, was married to *Raja Vighraha* as *Lakshmi* to *Krishna*.

Here follows the lineage of *Begraha* :—

12. There was a celebrated *Kshetriya* named *Kásiswara*, who was most powerful, subduer of his enemies, and superior to all the other *Rajas*, and who for his heroic disposition gained fame throughout the whole world.

13. From his line descended *Raja Bhabagupta*, who was renowned for his good counsels, illuminator of his line, and a great warrior. He repaired the image of the *Sun*, established in some forest adjacent to *Vada*, where he reigned for a length of time.

14. From the line of *Bhabagupta*, sprung *Raja Sangana*, who gained the kingdom of *Badari*, and was himself respected by all. His son was *Ballabha Raja*, who also had a son named *Chara*, and from *Chara* was born *Bara Raja*.

15. From *Bara Raja* was born *Vighraha Raja*, who was respectable for his noble qualities, and the king of kings; and whose good name which he acquired by the power of valour, noble qualities, and liberality, has far surpassed the regions.

16. He, *Vighraha Raja*, was always attended by people of a good nature, and fond of many wives; he made his two lines, both paternal and maternal, honorable, and was beautiful in person, ruler of the world, very strong, superior to mankind, and like *Mádhava*, (*Krishna*), in disposition, though a man.

17. He, *Vighraha*, having gained so merited a wife, *Láhiní* (as above mentioned,) enjoyed her, and she too being married to so desired a lover as *Vighraha*, who was like *Indra* in the earth, (was likewise happy.)

18. She soon after the sudden demise of her husband, being deprived of all sorts of happiness in the world, at last took her abode in to the residence of her brother at *Vada*.

19. This line, from which sprung *Raja Vasistha*, was also denominated "Vasistha line."

20. In Vada, the shrine of *Nagradha* is to be found. There *Vasistha*, who was great, established the images of the *Sun* and *Siva*, who yield salvation, and caused the temples, palaces, walls, forts, &c. to be erected, and tanks to be dug.

21. There further the Brahmanas, who have completely studied Vedas, which are difficult, were in no instance proud.

22. *Vadapoor*a, which is inhabited by people who are virtuous and attentive to their faith, and as well as by musicians, heroes, and warriors, &c. and commodiously situated for commerce, was looked at as if the second heaven.

23. Near this is the river *Saraswati*, having a ghaut constructed by the Raja, its water was adorned with the flowers for worship, nay, it is as if the mother to the Brahman females.

24. Here the inhabitants, who are all patriotic, wise, mild, addicted to worship the gods and Brahmanas with the gifts of variety, and renewed for talents, are always devoted to *Bhanu*, (the Sun.)

25. Here the queen *Lahini* mourning the death of her beloved consort arrived, accompanied by Brahmanas, and being sensible of the instability of worldly pursuits as well as of life.

26. Repaired the old temple of *Bhanu*, which had been once more repaired by *Vasistha* when fallen down by time.

27. This temple of *Bhanu*, which was strongly built of bricks and stones, when completed exhibited the colour of clouds, and was so beautifully perfected that it resembled Himalaya, the mountain where *Siva* resides.

28. Its staircase, which is beautiful as ought to be in its kind, and built of stones, is like that of the gods, which are not to be found elsewhere.

29. Further, she for the promotion of virtue, transformed the river *Saraswati* into a tank, which was useful to the gods as well as to men, and removing sin (by its water.) Its waves were so lofty, as if they were to touch the firmament.

30. She being conscious of the instability of the world, has performed this deed of virtue by the expenses of her own.

31. So long as the *Surabhi** shall continue to graze in the region of cows, and the waves of the seas agitated by the wind, the sun with his one-wheeled car shall endure, so long shall this tank exist, the water of which is pure as the rays of the stars.

32. This eulogy was made by Matri Sarmá, a Brahmana, who was the son of Hari, and the well-wisher of Láhini for the benefit of all.

33. It was engraved by Sivapála, the son of *Dorhaka*, who had his dwelling in the fort of Raja *Aswapati*, in the Samvat year 1099.

AN ABSTRACT BY KAMALAKANTA PUNDIT.

Literal Translation.

The particulars of the *Janaka* Rajá's birth are already detailed in the preceding slokas, extracted from *Śrīmat Bhāgavata*.

From the line of this *Janaka* sprung many powerful Rajás, from some of these was born Rajá *Ootpala*; from *Ootpala*, *Aranya* Rajá; from *Aranya* Rajá, *Adbhúta Krishna* Rajá; from *Adbhúta Krishna* Raja, *Vasodeba* Rajá; from *Vasodeba*, *Srinátha Ghosi*; from *Srinátha*, *Mohepála*; and from *Mohepála*, *Vandhooka*; from his wife named *Ghrita Devi*, was born Rajá *Púrnapála*; whose younger sister was *Láhini*, the restorer. Here also follows the lineage of *Vigraha* Rajá, whom she had been married to, but unfortunately for a short duration, when he, (*Vegraha* Rajá,) departed this life, leaving *Láhini* a widow, who from that time took up her abode into the residence of *Purnapála*, her brother. The lineage is this. There was a Rajá named *Kásiswara Dwijáte*, and from his line descended a Rajá named *Bhábogúpt*, who had also once repaired this very temple of *Bhanu* (Sun) in the forest of *Vadapura*, where he had reigned for a while. From him sprung *Sambara*, a Rajá who also ruled the country of *Vadari*. From *Sambara* was born *Ballabha* Rajá, who had a son named *Chara*, and from *Chara* was born *Vara* Rajá, and from *Vara*, *Vegraha* Rajá, the husband of *Láhini*. It was she who caused the temple of *Bhanu*, formerly established in the forests of *Vada* to be repaired, as well as a reservoir of water made therein.

* An eternal cow, yielding every thing desired.

नागराक्षरलिखितवसन्तगडदेशीय प्रशस्तिः ॥

प्रणम्य हरिपुत्रेण कविना मातृशर्मणा । सुहृद्विततरां वाणीं
प्रशस्तिः सुवृता मया ॥ ज्योतिर्ज्योतिविदां भवः शिवधियां दृष्टः परं
चक्षुषा तत्पाराधनतः स्मृतः कलुषहा सर्वप्रकाशो महान् । तत्
ज्ञानमसंवृतं मतिमतां ज्ञाता च सत्कर्मणां पायादो वसुसिद्धकिन्नर
युतसैलोक्यदीपो हरिः ॥ वसिष्ठकोपाज्जनितः कुमारः : : :

: : : : (भूम्यां) महाबला यत्रनृपा वभूवुः ॥ अस्यान्व
ये ह्यत्पलराजनामा आरण्यराजो यः ततो वभूव । तस्माद्भूदङ्गत
ह्यर्णराजो विख्यातकीर्तिः किलवासुदेवः ॥ तस्यात्मजो भूवल्लय
प्रतिष्ठः श्रीनाथधीषी वृत्तवान् वराण्यः पुत्रोऽपि तस्मान्महिपाल
नामा । तस्माद्भूदन्धुकएव भूपः । अस्यापि कीर्तिः सुरराजलोके
प्रगीयते वै सुरकिन्नरीभिः । वीणानिविष्टं करजांगुलीभिः । विमुक्त
कण्ठोभिरलंकृताभिः । येनाहृता शौर्यवलेन लक्ष्मीर्विख्याप्य भारं
परसैन्यमध्ये । अस्यापि भार्या घृतदेविनाम्नी रूपेण शीलेन
कुलेन युक्ता । तस्माद्मुष्यांभुविपूर्णपालः पूर्णो नृणां पालयशोभिपूर्णः ।
महाराणेनापि विजित्य राष्ट्रं नामा यः भूतं वलदर्पदेति ॥ कनककर्णि
कभूषिततारया करपदेमणिभूषितवीणया । विवुधराजकुले सुर
कन्यया सदसि यस्य यशः खलु गीयते ॥ हत्वा येन रिपून् युधा च वज्र
शः प्रख्याप्य भारं स्वकं विक्रान्तामदशालिनो वरगजानद्वाः स्वके मंदि
रे । पूर्णः पालकुलप्रदीप इव यो ऽप्यार्थ्यावते धार्मिके । अत्रश्रीः पर
मार्थवंशतिलकेराज्ञीस्थिरा शासति । अस्यानुजालाहिनिनामराज्ञी
लक्ष्मीर्यथा तामरसैर्विह्वलीना । ऊढापि या विग्रहभूभुजेन सत्या यथा
पूर्वमधोल्लजेन ॥ अस्यान्वये यः ॥ आसीद्विजातिर्विदितो धर
ण्यां ख्यातप्रतापो रिपुचक्रमर्ही । यो दुःखशौर्यार्ज्जितभूयशस्यः का
शीश्वरः सर्वनृपप्रधानः ॥ तदन्वये ख्यातमतिर्नृपो भूत् कुलप्रदीपो भव
गुप्तनामा । उद्धृत्य वेशं वनवासिभानोर्वदेषुराज्यं कृतवान् स वीरः ।

अस्यान्वये संगनराजनामा वन्द्योनरैर्यौवदरीसमाप्तः । तस्माद्भूदल्ल
 भराजभूपश्चरोपितस्मादरराजभूपः । वभूव तस्माद्गुणिताप्रधानो
 नृपोत्तमोविग्रहराजनामा । प्रदानशौर्ध्यादिगुणैरुदारैर्यशोययौ
 यस्यविजित्य लोकान् । द्विजिह्वरिपुवाहनो ललनकान्तरापूजितः
 कुलद्वयह्यतोन्नतिर्विधृतचारुलक्ष्मीवपुः । स्वपौरुषधृतावनिर्व्वलनि
 विष्टवक्षामहान् वभूव नृवरोत्तमः स नररूपधृडमाधवः ॥ भाट्यसचा
 वाप्य गुणैः समेतां वितोषितां वै वुभुजे च भोगं । सापि प्रियं प्राप्य
 पतिम्बरेण यदन्महीन्द्रेण समंचरेमे ॥ अस्मिन्मृते भर्त्तरि दैवयोगाद्
 भ्रातुर्गृहं सा प्रियतावियुक्ता । आवेशिता वै नगरे बदेऽस्मिन्दैवात्
 प्रह्नीनैवसुखक्रमेण ॥ वसिष्ठराजोपि अत्रासीदतोयंवसिष्ठराजाच्चे
 यो ऽपि (जातमत्रपावारुणिनापि) अत्र न्यग्रोधस्याश्रमः ॥ ॥ स्थाने
 कर्मभर्गा स्वमतौ वसिष्ठोमुक्तिप्रदौस्थापितवान् वरिष्ठः । तद्वददाख्य
 नगरेवने ऽस्मिन् वज्रप्रसादान् ह्यतवान् वसिष्ठः । प्राकारवप्रोपवनै
 स्तडागैः प्रासाद (वेश्मैः) सुधनैः सदुर्गैः ॥ अतिमन्त्रोदमचोभ्यं पार
 गावक्रमाकुलं । वेदार्णवं द्विजाः सम्यग् यत्र तीर्णाप्यगर्व्विताः ॥ लोकै
 र्धर्मपरैः स्वकर्मनिरतैः सङ्गिः सदावासितं । आवृत्त्याजनसम्मतैः
 प्रतिदिनं नित्यं वणिग्भिव्वृतं । पौराणैर्गणिकाजनैर्व्व्यसनिकैः श्रूरै
 र्जनैः संकुलं स्वर्गस्थानमिवापरं वदपुरं चौणीतले संस्थितं । मरुद्ग
 ता यत्र सरित्सरस्वती सोपानपंक्त्या च नृपेण निर्वृता । सुपुण्य पुष्पोदक
 फेणवाहिनी द्विजायमाना जननीववेष्टिता ॥ ये सर्व्वं पालयन्ते नगर
 हितरतानीतिमन्तः प्रशान्ता देवान्विमान्यजन्ते वनभवनमहीवस्त्र
 रत्नादिदानैः । ख्यातायेचैव नित्यं त्रिभुवनवलये सदगुणैरेवनीताः ।
 तेस्मिन्पौराः समस्ताः सकलजनहिताभानवे भक्तिमन्तः । सात्रागता
 लाहिनिनामराज्ञीर्भर्तुर्व्वियोगेन निषोडितांगी । अस्मिन्पुरे विप्र
 जनैः समेत्य दृष्ट्वा तुतोषान्तरनात्मवुद्ध्या भानोर्गृहं दैववशादिभक्तं
 वसिष्ठपौरैः सुहृतां यदासीत् विनाशिसर्व्वं सहजीवितेन ज्ञात्वा गृहं

कारितमाशुभानोः लोकप्रयोगा सुकृता दुरापा सुस्निहसन्धीघटि
 तोतपलेव । सोपान पंक्तिः शुशुभे सुवद्वा निश्रेणिभूतेव दिवौकसा
 नां ॥ देवैः समस्तैर्मुनिभिश्च जुष्टा पापापह्वा व्याप्यवियत् स्थिता या
 जीवैर्वृता लाहिनिपुण्यहेतोः सारस्वती शेषजनस्य वापी । निष्पा
 द्य सुकृतौ कृत्वा अर्थदत्त्वा पुनःपुनः :: वैनाशिकमिदंचान्यज्
 ज्ञात्वालोकस्यचर्चितं ॥ यावद्गोलोकवृत्तिः प्रवहति सुरभिर्थावद्
 कीन्तरीक्षे । यावद्दीच्यः ससुद्रे पवनविधुनिताः संतताः प्रोच्छलन्ति ।
 यावद्दोम्नि प्रदीप्तं प्रवहति मिहिरस्यंदनस्यैकचक्रं वाग्धेषातावद्
 क्षणमुडुकरसदृशी कारकस्यातिकांता । कृतेयंह्रिपुत्रेण मातृशूर्म
 द्विजन्मना सुविलोकहितार्थाय लाहिन्याश्च हितैषिणा । आसीच्च ना
 माश्वपतेः सुदुर्गेदुर्गाकृती दोडकसूत्रकारः । अस्यापि सूनुः शिवपाल
 नामा यनोत्कृतेयं शुशुभाप्रशस्तिः ॥ नवनवतिविहासीद्विक्रमादित्य
 कालेजगति दशशतानामग्रतोयचपूर्णा । प्रभवति नभमासे स्थानके चि
 त्तमानोः स १०६६ ॥

अस्यसंचपः ॥

वसिष्ठकोपाद् यथा जनकोजातस्तद्वृत्तांतः श्रीभागवत नवमस्कंद
 श्लोकेभ्यश्च वगंतव्यः ॥ जनकवंशे महावलाराजानो बभूवुः । तदेक
 तमवंशे उत्पलनामा राजा तत्पुत्रः आरण्यराजः तत्पुत्रः अद्भुत
 कृष्णराजः । तत्पुत्रो वासुदेवराजः तत्पुत्रः श्रीनाथघोषी तत्पुत्रो
 महीपालः तत्पुत्रो बंधुकास्तस्य भार्या घृतदेवी बंधुकात् घृतदेव्यां
 पूर्णपालनामा राजा पूर्णपालस्य अनुजाभगिनी लाहिनी विग्रह
 नाम्ना राज्ञा विवाहिता । विग्रहराजे मृते लाहिनी विधवा तस्य
 पूर्णपालस्य भ्रातुर्गृहे स्थितवती । विग्रहराजस्य पूर्वपुरुषाणां कथा
 यथा ॥ काशीश्वरो द्विजातिराजआसीत् तदंशे भवगुप्तो येन वद

पुरेवनवासिभानोजीर्णोद्धारः कृतः । वदस्य राज्यं च स्वीकृतं तदन्व
ये संवरनामा राजा स वदरीराज्यमाप तस्य पुत्रोवह्मराज स्तस्य
पुत्रः श्वरः तत्पुत्रोवरस्तत्पुत्रोविग्रहराज स्तत्पत्नी लाहिनी
वदेष्ट वनवासिभानोर्मदिराणां जीर्णोद्धारं एकावाप्यो च कृतवती ॥

Proceedings of the Asiatic Society.

(Wednesday Evening, 11th August, 1841.)

The Honorable Sir E. RYAN, President in the Chair.

FLETCHER HAYS, Esq. 62d N. I. Junior Assistant Governor General's Agent, Saugor, was proposed a Member by DR. J. McCLELLAND, seconded by DR. J. GRANT.

HENRY WALKER, Esq. Surgeon to the Governor General's Body-guard, was also proposed a Member by DR. J. McCLELLAND, seconded by the Secretary.

Library and Museum.

Books received for the Library of the Asiatic Society, for the Meeting on the 11th August, 1841.

Jamieson's Edinburgh New Philosophical Journal, No. 59, January 1841, 1 vol.

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 3d Series, Nos. 115 and 116, Vol. 18th, February and March 1841, 2 vols.

Calcutta Christian Observer, New Series, Vol. 2d, No. 20, August 1841, 1 vol.

Map of the Provinces of Bengal and Behar, by J. B. Tassin, Calcutta, 1841, 1 vol.

Annuaire des cinq départements de L'Ancienne Normandie, 1839, 5e. Année, Caen 1839, 1 vol.

Acts de L'Académie Royale des Sciences, Belles Lettres et Arts de Bordeaux, 1re. Année 1re. à 4re. Trimestre, Paris, 1839, 4 vols.

Extrait des Séances de la Société Royale D'Agriculture et de Commerce de Caen, par M. Lair, 19 Janvier 1839, et 18 Janvier 1839, (2 copies each,) 4 vols.

Reponse de M. P. A. Lair, a une lettre de M. Mercer, Caen, le 30 April 1840, 1 vol.

Société Royale D'Agriculture et de Commerce de Caen. Rapport sur le 2d volume des Institutions Hippiques, Janvier à Juin 1840, 6 vols.

Ditto ditto Programme de deux Concours, 1840, 1 vol.

Extrait des Rapports faits par M. Levardeois, 1840, (2 copies,) 2 vols.

De L'Extinction de le Mendicité, par M. Lecerf, Caen, 1840, (2 copies,) 2 vols.

Hammer Geschichte der Goldenen Horde in Kiptschak, des ist der Mongolen in Russian Pesth, 1840, 1 vol.

Moorcroft's Travels in the Himalayan Provinces, &c. in 2 vols. (10 copies,) 20 vols.

Humboldt über die Kawi—Sparche auf der Insel Java, vols. 2d and 3d, 2 vols.

Transactions of the Royal Irish Academy, vol. 19th, part 1st, Dublin, 1841, 1 vol.

Wight's Icones Plantarum India Orientalis, or Figures of Indian Plants, vol. 2d, parts 1st and 2d, 2 vols.

Reports and Abstracts of the Proceedings for investigating Coal and Mineral resources of India, May 1841, Calcutta, 3 copies, 3 vols.

Madras Journal of Literature and Science, No. 29, October and December 1840, 1 vol.

- Yarrell's History of British Birds, part 24, London.
 Oriental Christian Spectator, vol. 2d. No. 6, June 1841, 2d Series, Bombay.
 Annals and Magazine of Natural History, No. 42, April 1841, London, pamph.
 Calcutta Monthly Journal, for June 1841, 3d series, No. 79, Calcutta, 1 vol.
 Hammer's Gemäldeaal, Funfter band Leipzig, 1838, 1 vol.
 First Report of the Elphinstone Native Education Institution 1840, Bombay 1840, pamph.
 Jahrbücher der Literatur, 1839, parts 85 to 88, 4 vols.
 Journal des Savants, December 1840, Paris, pamph.
 Société de Géographie Recueil de Voyages et de Mémoires, tome 6, 1 vol.
 Hádiakoon Najoon (Persian,) 1 vol.
 ? Chintamoney, (Sanskrit,) pamph.

Read the following Report submitted by the Officiating Curator:—

H. TORRENS, Esq.

Secretary Asiatic Society.

SIR,—For the month of July I have the honor to report as follows:—

Geological, Paleontological, and Mineralogical.—We are, I am glad to say, approaching the completion of the Geological series of our Catalogues, and some of the Mineralogical and Paleontological ones are also ready for the press. We are sadly impeded by the difficulties of deciphering labels, ascertaining collections, and by the printers. The Index to the whole of the Geological, Mineralogical and Paleontological papers in the Transactions, Journal, and Gleanings of Science is printed, and a copy is on the table. Our Secretary informs me it is his intention to print it in the Journal. I have also at his request been occupied this month with a paper on a fossil elephantine jaw from Jubbulpore, sent down by Dr. SPILSBURY, which in my limited knowledge of the subject, I am inclined to suppose may belong to a new species or variety? It is at least a piece of justice to Dr. SPILSBURY, who has done so much for the Museum, and for the Geology and Paleontology of Central India, that we should record in the fullest manner every thing relative to his contributions; and Mr. TORRENS has in this view been good enough to allow me to go to the expense of a plate to explain my views.

Osteological.—The Skeleton of the Neel-Ghye is completed.

Ornithological and Mammalogical.—Nothing new to report.

Museum of Economic Geology.—We have at length obtained here five, out of seven, cases from the Native contractor; and with the exception of a few trifling arrangements, I may say, that this part of the Museum is arranged. The Catalogue will also be completed in a few days.

Travelling Taxidermists.—At the end of the month of June we dispatched a Mr. GOMES, who had been employed by Dr. HELPER, as taxidermist on account of the Society, to Lieut. TICKELL, at Chyebassa, with a complete supply of every thing for his work, and a book of instructions. At Midnapore however he appears, according to Dr. PAGAN's account, to have taken fright at the stories of tigers and jungles, &c. if he went alone; and he returned to Calcutta, with the excuse, that he could not procure carriage, &c. We have however dispatched him again with two good men for his companions, and he will no doubt arrive safe. This return and delay has made his dispatch expensive, but a part of the expence is experience bought for future use.

Memorandum.—The expence including two months' pay in advance, is in round numbers as follows:—

	Rs.	As.
Book and tools, &c.,	10	0
Two Month's advance and travelling expences,	62	0
Total,	72	0
Return and re-dispatching,	48	0
Co.'s Rs.	120	0

Additions to the Museum have been as follows :—

Osteological.—Skeleton of the Neel-Ghye.

Mineralogical, Geological, and Botanical.—Coal, sandstone, limestone, iron-ore, garnets, hemp, dyeing drugs, &c. from the Chinnoor Sircar, collected by Dr. WALKER, presented by Government.

Museum Economic Geology.—Soils from Assam Tea Company.

Yours obedient servant,

MUSEUM, 31st July, 1841.

H. PIDDINGTON.

At the recommendation of a Sub-Committee the following order as respects the Numismatic Collections of the Society was recorded for future observance; viz. "That no coins be removed from the apartments of the Society without special permission for a special purpose, on a written order given on the responsibility of the Secretary."

A sample of a Table Cabinet (invented by the Secretary) for containing the Coins was submitted to the meeting, and one like it ordered to be prepared.

Read titles of BARON DE HAMMER's works prepared by DR. ROER, which the Secretary intimated he would publish in the Journal for the information of the curious, and should inquiry be made for any particular subject, that he would publish a translation of the same with the assistance of DR. ROER, who had kindly offered his services.

Read a letter from Mr. Secretary BUSHBY, of the 23rd June, 1841, forwarding an Extract from a Dispatch of the Honorable the Court of Directors of 28th April, 1841, expressing their wish to receive a selection of specimens of Fossil Geology of India, for their Museum at the India House.

Ordered,—That the Government be informed in reply that the Society would bear the request in mind.

Read a letter from Mr. Secretary BUSHBY of the 21st July 1841, with enclosures, requesting the opinion of the Asiatic Society as to the Inscription to be placed on Bheem Sing's Lath at Allahabad, adding at the same time, that "the Right Honorable the Governor General in Council would be unwilling to add any Inscription to the Lath itself."

Ordered,—That a communication be made in reply, that the Society concur in opinion with His Lordship in Council, that no Inscription should be on the Lath.

Read a letter of the 13th May 1841, from Moonsee RUTTUN SING BAHADOOR, of Lucknow, accompanied with a work compiled by him on Geography and Meteorology, which he offered for the kind acceptance of the Society, "as a humble token of the high admiration and respect in which the Society is universally held."

Ordered,—That the civility be reciprocated by the presentation to Moonsee RUTTUN SING, with a bound copy of the Transactions of the Society.

Read the following papers, the greater part of which were received by the Secretary as Editor of the Journal.

A Note on the Fossil Jaw of an Elephant sent from Jubbulpore by Dr. SPILSBURY, by the Officiating Curator. This was illustrated before the meeting by Crania of Fossil and recent Elephants, and by copies of the drawing made by the Officiating Curator to accompany his note.

Letters of 6th July 1841, from Dr. H. FALCONER of Seharunpore, and H. PIDDINGTON, Esq. Officiating Curator, on the subject of the late grand Cataclysm on the Indus, described as one of the most remarkable natural phenomena hitherto recorded as having occurred on the continent of India. The Secretary stated, "that having communicated with the Private Secretary to the Right Honourable the Governor General, he had the satisfaction of stating, that LORD AUCKLAND had personally addressed Mr. CLERK, (Political Agent on the N. W. Frontier,) on the subject at length, requesting that inquiries may be made, and suggesting modes of conducting it.

N. B.—The Secretary has since learned that before the receipt of LORD AUCKLAND's letter, Dr. JAMIESON had been deputed by Mr. CLERK, for the purpose of investigating the causes of the Cataclysm.

A letter from Lieut. POSTANS, of 5th July 1841, with a Translation of the History of Sindh, (*Chuch Namuh*). This interesting work has already appeared in an abridged form in the Journal. The Secretary begged to state, that he would be happy to place this valuable paper at the disposal of the Committee of Papers, for publication in the Transactions of the Society. Referred to the Committee of Papers.

A letter from Capt. SHORTEDE, of 24th July 1841, forwarding a new Table of Proportional Logarithms, composed by himself.

A Note on the Cerous Elaphus, by B. H. HODGSON, Esq.

A letter of 17th July 1841, from JAMES MIDDLETON, Esq. forwarding Copy of the Sanscrit Treatise, shewing the use of the silver Astrolabe from Kotah, now in the possession of the Society, which Mr. M. had been unable to meet with when he wrote his remarks (published in the Journal) on this curious instrument.

An account of Arracan, by Lieut. PHAYRE.

A letter of 30th July 1841, from Capt. J. S. BURT, in reply to one from the Secretary regarding the Inscription at Bussuntgurb near Mount Aboo, as also a letter from Lieut. A. CUNNINGHAM of 18th July 1841, connected with the above subject. The names of princes reigning in Odeypore, recorded in this Inscription are new, and will it is believed be proved satisfactorily to supply the hiatus after *Bhrutiprad*, and *Allata* in Tod's and Prinsep's (Useful Tables) Genealogical Lists.

Specimen of a short History of the Emperors of Hindostan to the reign of Shah Allum the Blind, by Mr. THOMAS CONLAN. It was suggested that this paper should

be laid before the Committee of Public Instruction, in case it might be found expedient to communicate with Mr. CONLAN.

Read letter from Dr. ROER, Librarian, reporting progress in the classification and arrangement of Books in the manner proposed by him.

Ordered,—To be referred to the Committee of Papers for consideration.

Read a letter from Mr. Secretary MADDOCK of the 2d August 1841, forwarding for deposit in the Society's Museum, and for such notice in the Journal as they may seem to deserve, a collection of Specimens of Minerals collected by Lieut. BIGGE, Assistant Agent to the Governor General, North East Frontier in the Cachar Hills, together with a report on a portion of them by Capt. TREMENHEERE.

Read a report by Mr. JAMES HYLAND, on the Coal Deposit of Cap Island in Arracan, with specimens of Rocks of the same and other places.

Read letter from Messrs. ALLEN AND Co. of London, of 31st May 1841, advising the dispatch of a parcel of Books, presented to the Society by Dr. FREYTAG, Professor at the University of Bonn on the Rhine.

Ordered,—That the thanks of the Society be accorded to the Professor, and that a selection of the Works of the Society be presented to him in return.

The Officiating Curator submitted for the inspection of the Meeting the Geological Catalogue, and Index to the same prepared by him, which would appear in the Journal. The Secretary was requested to take that opportunity to print 300 extra copies for general use.

For all these contributions and presentations thanks were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

*Account of Arakan.** BY LIEUT. PHAYRE, Senior Assistant Commissioner, Arakan.

Arakan Proper, called by the natives *Ra-khoing-pyee*, or *Ra-khoing* country, lies between 20° and $21^{\circ} 10'$ N. Lat. on the sea coast; in the interior it extends to about $21^{\circ} 40'$. It is bounded on the west by the Bay of Bengal and the estuary called *Naf*; on the north, by a range of mountains named *Wé-la-toung*, and by a line not well defined running N. E. through a hilly country to the *Kola-dan* river; on the east by the *Yú-ma* mountains; and on the south it is separated from the district of *Aeng*, and the island of *Rambree*, by various straits and creeks.

On the north, between *Arakan* and the *Chittagong* district, at some distance from the sea-coast, there are several tribes living among the hills and forests, who have hitherto remained independent of the British government. Our authority extends up the *Kola-dan* river, about 130 miles north from the town of *Akyab*, to the mouth of a stream called the *Oo-tha-lang*, but beyond that, stretch mountains and forests to the north-east, hitherto untrodden by civilized man, as far as *Munneepoor*; here live various savage tribes, who appear to be in a constant state of warfare with each other. On the east our boundary up to the *Yú-ma* mountains is only nominal. The tribes

* We give the name *Arakan* as a general term to four districts, which by the natives is restricted to what is the present district of *Akyab*. In this paper the name *Arakan* is used in the latter sense.

for 15 or 20 miles west of that range are independent, and have never submitted to any regular government, neither to that of the *Arakan* kings, the Burmese, or the British.

The boundary above described contains about six thousand square miles, of which from 12 to 1500 on the eastern side, are, from the inaccessible nature of the country, under the controul of the mountain tribes.

In *Arakan* there are three principal rivers; viz. the *Mayú*, the *Kola-dan*, and the *Lé-myo*; these all flow in a general north and south direction, at an average distance of 15 or 20 miles apart, the *Mayú* being to the west, the *Kola-dan* in the centre, and the *Lé-myo* to the east. Their channels are separated by ranges of hills running in the same general direction of N. and S.; the principal rocks are sandstone and shale.

In the upper course of these rivers, or about 150 miles from the sea, the hills are lofty, and so massed together, that the direction of the ranges is not discernible; but as the rivers descend, the country becomes open; then ascend a height; and single ranges of hills are seen, with broad and fertile plains extending from their bases as far as the eye can reach; the plains, dotted here and there with villages, are intersected by innumerable streams, and the bright-green rice fields, alternate with dark forest tracts. The three rivers for the last 20 or 30 miles of their course, are connected together by a vast number of creeks, through which all communication in the delta takes place. The *Kola-dan* in the lower part of its course is called the *Ga-tsha-bha*. The different branches of the *Lé-myo* in its lower course take various names.

The ancient history of *Arakan* presents such a tangled web of fiction, that I shall not attempt to give it in detail. I have not had sufficient leisure to study the subject, and my object being merely to give an account of the present state of the country, I shall only refer to its ancient history so far as is necessary to give a general idea of its condition previous to the British conquest, and to shew what race the present inhabitants belong to. The inhabitants are,

In the Plains.—1. *Ra-khoing-tha*.—2. *Ko-là*.—3. *Dom*.

In the Hills.—1. *Khyoung-tha*.—2. *Kúiné* or *Kwé-mé*.—3. *Khyeng*.—4. *Doing-núk*, *Mroong*, and other tribes.

The *Ra-khoing-tha* and *Khyoung-tha* are of the same race. Like the Burmans their national name is *Myam-má*, the first appellations here given being merely local, the former signifying inhabitant of *Ra-khoing* country; the latter, or *Khyoung-tha*, being the name given to those who inhabit the banks of mountain streams within the same villages as the hill tribes, and support themselves by hill cultivation. How they came to be separated from their countrymen does not appear; it is rather extraordinary that they should remain so, as they subject themselves in the hills to great hardships, while to procure a subsistence in the plains is a matter of no difficulty. Lately I have seen some instances of their settling in the plains and cultivating land with ploughs. The religion of both these people is Budhism; they may be said to belong to the Mongolian family, or to be between the Mongolian and Malay race; their written language is the same as the Burmese; in the colloquial there are some provincial differences.

The *Kolas*, or Moosulmans, are of an entirely different race to the preceding, they being of Bengalee descent. The *Arakan* kings in former times had possessions all along the coast as far as *Chittagong* and *Dacca*. Coins are still extant, struck by the viceroys at the former town, with Bengalee and Persian characters on one side, and Burmese on the reverse. While the Arakanese held these possessions in Bengal, they appear to have sent numbers of the inhabitants into *Arakan* as slaves, whence arose the present *Kola* (foreign) population of the country; they form about 15 per cent. of the whole population. The *Arakan* Moosulmauns preserve the language of their ancestors for colloquial purposes, but always use the Burmese in writing; they have also adopted the dress of the country, with the exception of the *goung-boung*, or head dress.

The third class in the plains are *Doms*. These form such a minute section of the population, that it is scarcely necessary to mention them. The *Doms*, it would appear, were brought from Bengal to be used as *Phrakywn*, or pagoda slaves. It is a strange anomaly in the Búdhist religion, (as it prevails in Burmah,) that the servitors of the temples are invariably outcasts, with whom the rest of the community will hold no intercourse. In Burmah Proper, pagoda slaves are pardoned convicts, or persons condemned to the employment on account of crimes. The kings of *Arakan* finding in Bengal a number of degraded

castes ready made to their hands, imported them and their families as perpetual and hereditary pagoda slaves. Their duties were to sweep in the vicinity of the temple, clear away the remains of offerings, whether of food, flowers, &c. and also to wash the idol. These people of course are now released from their compulsory servitude, and have become cultivators, but in consequence of their former condition, they are regarded by the people with as much disgust as they would be from their low caste, by *Hindoos*.*

Since the conquest of *Arakan* by the English, a large number of Bengalees have settled in the town of *Akyab* as shop-keepers, and in the vicinity as cultivators; these are not taken into account. In the interior reside a few Brahmins, some of Munnipooree descent, who were brought by the Burmese as astrologers, and some are descendants of colonists from Bengal, brought by the *Arakan* kings. I am inclined to think, that the Arakanese monarchs were in latter times very Brahminically inclined, and that the Burman conquest by infusing fresh Buddhist vigour, and contempt for *Kolas* generally, followed by our own occupation of the country, has prevented the introduction of Hinduism, which probably would have been brought about in the same manner as it was in *Muneepoor*. The hill people, the *Khyoung-thás*, have already been described; next come the *Kú-mí*, or *Kwe-mí*, tribe.

* The Arakanese have so far adopted the Hindu prejudice against them, that if any *Ra-khoing-thá* has unwittingly eaten with, or drank water from the utensil of a *Dom*, or other low caste Hindu, he is excluded from society until he has undergone certain purifications. Some years ago, when in consequence of inundations on the W. coast of the Bay of Bengal the population was reduced to great distress, a number of Ooryas found their way to this coast, and were purchased by Arakanese, or pledged themselves for service, they became inmates of families, and eat and drank with them; all at once it was noised abroad, that Ooryas were no better than Doms, than pagoda slaves. Numbers of respectable persons, men, women and children were forthwith declared unclean. They were excluded from the villages, the public festivals, and the *kyoungs*, or monestaries. To restore them was no easy matter. In former times the king had only to smoke a cigar after it had been used by an outcaste, and he was deemed restored forthwith; but now the royal line no longer existed in the country. At length it was settled that a meeting should be held of the most respectable men in the country, who agreed to smoke with the unclean; the pipe to be handed last to the European Magistrate, and then a general feast to conclude all. The ceremony was gone through with the half of numerous *Phoon-gyees*, (or priests), and much to the comfort of the outcasts, deemed and held to be sufficient for their restoration to society.

This hill tribe belongs to the same great family of the human race as the *Myam-má*; their languages being apparently of the same structure; their physiognomy alike; they have black strait hair, high cheek bones, oblique eyes, and scanty beards. The *Kúmís*, in short, appear like *Ra-khoing-thás* in a more rude state of existence; the traditions of the latter people refer to the former as already possessors of the country when the *Myam-má* race entered it. The *Kumís* chiefly inhabit the *Kola-dan* and its feeders. They are divided into several clans, which will be enumerated hereafter.

The next hill tribe is the *Khyeng*. There is comparatively a small number of this people within our border, that is to say, within the actual bounds of British authority in *Arakan*; only those who live on, and near to the banks of the *Lé-myo* river, are subject to our controul. Eastward of this river, up to the great *Yú-ma-toung* range, there are powerful tribes of this people, who rejoice in perfect freedom, (as long at least as they can defend themselves from the attacks of their neighbours.) They are separated from British authority by pathless mountains and forests, and being to the west of the *Yú-ma-toung* range, the Burmese have no dominion over them; many indeed to the eastward of those mountains are virtually independent of Burmah. The *Khyengs* live in the same primitive style as the *Kú-mís*, their manners and appearance being similar.*

The remaining hill tribes are the *Doing-núh* and the *Mríng*. They both inhabit the upper course of the *Mayú* river. The language of the first is a corrupt Bengalee. They call themselves *Kheim-bá-nago*. Of their descent I could learn nothing; probably they may be the offspring of Bengalees carried into the hills as slaves, where their physical appearance has been modified by change of climate. In religion

* There is a class of people residing in the Chittagong district, who call themselves *Raj-bunsé*, and in Burmese *Myam-má-gyee*, or "great *Myam-mas*." They pretend to be descendants of the kings of *Arakan*, a flattering fiction which they have invented to gloss their spurious descent. They are doubtless the offspring of Bengalee women by *Myam-más*, when the latter possessed Chittagong, and other districts in Bengal. Their dress and language are Bengalee; but they profess the religion of their fathers, viz. Buddhism. These people are called Mugs in Bengal, and being well known in Calcutta as *Mug cooks*. I believe it is pretty generally supposed that the Arakanese are one and the same with them; a terrible insult to the Burma race! All Arakanese are termed Mugs by the people of India, from whom Europeans have borrowed the name. How it arose I cannot say.

they are Buddhists. The people called *Mrúng*, by the Arakanese, announce themselves as descendants of persons carried away from Tipperah several generations back by the *Arakan* kings. They were first planted on the *Lé-myo* river, with the view I suppose of cutting off their retreat to their own country; but when *Arakan* became convulsed in consequence of the invasion of the Burmese, they gradually commenced leaving the *Lé-myo*, and returning through the hills towards their own country. For a time they dwelt on the *Kola-dán*; now none are to be found in any part of *Arakan*, save on the *Mayú* in its upper course, and only a few stragglers there. Many still reside, I understand, in the hills on the E. frontier of the *Chittagong* district. By a reference to a few words of their language, given in the appendix, those acquainted with the language of the *Tipperah* tribes will be able to decide whether the tale the *Mrúngs* tell of their descent be true or not.

Having given an outline of the various tribes which now inhabit *Arakan Proper*, I proceed to offer some suggestions as to the original inhabitants. The traditions of the *Ra-khoing-thás* refer expressly to the hill tribes as being in possession of the country when their own ancestors entered it. The *Khyengs* have a tradition that they are direct descendants of some Burmese refugees, or the remnants of an army that was lost in the mountains when attempting to penetrate to the westward. From the *Kú-mís*, I could gather nothing as to their own origin, but I consider both tribes akin to the *Myam-má* race, and distinct from the Malay.* If it be true, as is asserted, that the immigration of the Malay race to Malacca, Quedah, and other districts from Sumatra is an occurrence comparatively of late date, then it is very improbable that they should have come so far north as 21° of latitude in a remote era. The *Khyengs* and *Kú-mís* are probably an offshoot of the *Myam-má* race, who left their original seat earlier than the immediate ancestors of the *Ra-khoing-thás*. The most southern *Kú-mí* tribes who inhabit the *Kola-dán*, represent themselves as being driven further south each succeeding year, in consequence of the encroachments of the fiercer tribes beyond them. These encroachments still proceed.

* To whom the hill tribes in this quarter have been assigned by Pemberton.

The *Ra-khoing-thas*, (whose national name, as before mentioned, is *Myam-ma*, whence the corruption *Bur-má*,) are so called as inhabitants of the country *Ra-khoing*, and this name is said to be derived from the Pali word *Rak-kha-pu-ra*, signifying "abode of demons," which name may have been given to the country by the Buddhist Missionaries from India. The classic name for the country, and that used in all state papers, is *Dha-gnya-wa-ti*.

The book which the learned refer to, as containing the whole account of their nation, is called *Ra-dza-wang*, or "History of Kings," of which many copies exist, differing from each other in details of the early history, yet preserving alike the main features; there we are told that in *Oo-taya*, the northern division of the world, reigned the king *Ma-ha-tha-gya*, whose younger son, in consequence of a quarrel, was forced to fly his country. He came to the kingdom of *A-the-toing-dza-na*, (supposed to lie north from the city of Ava,) where he married the king's daughter, and had by her ten sons and one daughter. These children departed to seek a home elsewhere; they came to the site of the present town, *Than-dwe*, (*Sandoway* as we usually write it,) which acquired its name from their binding it with an iron chain, so that the country no longer moved as was its wont; the germ of this account may possibly be the tradition of an earthquake or volcano in some remote period. The ten brothers and their sister now acquired the country. In various ways, eight of the brothers were killed, the remaining two brothers and their sister, who is named *Ang-dza-na-de-wi*, pursued their way northwards for *Arakan*. They were accompanied by a *Byam-ha*, which in Burman Buddhist writings usually means I believe a celestial being, but here it is interpreted to mean a human Brahman or *Pun-na*;—whence he sprung does not appear. On the road the two remaining brothers were killed, one by a *Bhi-lú*, or human flesh-devouring monster, the other accidentally by a hunter's arrow, discharged at a deer. The *Pun-na* and the lady proceeded alone; on their arrival in *Arakan*, they find the male line of the royal family is extinct. So confused is the account, that *Arakan*, which before was represented as one vast forest inhabited only by *Bhi-lus*, is here said to have a large population, and a queen over it. The *Pun-na* forthwith marries the daughter of the last king, and their progeny fill the throne for several generations. The sister

of the ten brothers becomes the second, or inferior wife of the *Pun-na*. Why this long story of the ten brothers and their sister was given does not appear; they are not of any importance to the after-history, for according to it none of their descendants fill the throne, or exercise any authority; but in this account we may recognize the first entrance of the *Myam-ma* race into *Arakan*, which we may infer, by the story of the town of *Than-dwe*, took place rather by the delta of the *Arawati*, where communication is easy, than by the mountain passes farther north.* Yet the *Ra-khoing-thas* of the present day believe themselves to be descendents from a western people. They confound those who were their religious instructors with their progenitors, and fancy themselves of the same stock as the Hindus. The above abstract of their history contains evident marks of a mixture of genuine national tradition, and the invention of later times, when they had been taught the use of letters, and had been instructed in religion by Buddhist Missionaries from India.

To proceed with the historical abstract, the descendants of the *Pun-na* long governed the country,† but supernatural monsters again prevailed, and the whole population was destroyed. All these events occurred after the manifestation of the Boodh *Ka-tha-ba*, and before the advent of the Boodh of the present period, *Gau-ta-ma*. As this latter person is supposed to have lived B. C. 543, the *Arakan* annals vie with those of India in antiquity!

Arakan then was again made desolate by *Bhi-lus*; at this time *Ang-dza-ná*, the son of the king of *Kapi-la-wot*, (or *Ma-ga-dha*,) having left his country and wandered through forests and mountains, arrived at the source of the river *Kola-dan*; there he had intercourse with a doe, which big with young, was carried down the stream in a flood, and cast ashore at the mouth of the *Mee-khyoung*, a mountain stream which joins the *Kola-dan* from the eastward; there the doe brought forth a son. A hill chief, of the *Toung-mru* tribe, was out hunting, when his dog pursuing the scent of the doe led him to the spot where she lay, and he saw the body of a beautiful child "shining,"

* I refer here to the entrance of the people who now inhabit the plains, not to that of the hill tribes, who though I suppose them to be of the same stock, had come much earlier, and were more rude than the new comers.

† Cities on the east, and ninety-nine on the west of the *Ga-tsha-bha* river are said to have flourished.

as the history has it, in the midst of a bush ; the doe started off, and the hill chief taking up the infant conveyed him home. The child when grown up, marries the chief's daughter ; but not from this union was the royal race of *Arakan* destined to spring. The doe-born youth is named *Ma-ra-ya* ; he becomes the favourite of the *Nats*, who furnish him with magic weapons, and he clears the country of the monsters who ravaged it. By some strange accident, which is not explained, a princess of the *Pun-na* dynasty has been preserved amidst the general ruin ; she is discovered by the doe-born son of *Ang-dza-na*, and they are married. The country once more becomes populated, and the city of *Dha-gnya-wa-ti* is built to the north of the present city of *Arakan*.

Of this race fifty-five kings reigned throughout a period of 1800 years ; another dynasty then succeeded, which numbered twenty-four kings, whose reigns extended throughout a period of 835 years. Then came the king *Tsan-da-thoo-vee-yá*, who was not of a different dynasty, but in his reign the Boodh *Gau-ta-ma*, having been born in *Ma-gadha*, visited *Arakan* ; the pious king in honour of him built the famous temple of *Ma-ha-mu-ni*, which still exists ; before *Gau-ta-ma* left *Arakan*, the king caused a brazen image of him to be cast ; or rather it was miraculously formed by the *Nats*, being a likeness of the Budh when living, and being for ages after endowed with the faculty of speech, it became celebrated in all Budhist countries. This image was carried away by the Burmese after their conquest of the country in A. D. 1784, and is still to be seen in *Amerapoora*, where it is regarded with peculiar devotion.*

The successors of *Tsan-da-thoo-vee-ya* are recorded in regular succession, though the dynasties are frequently changed. One hundred and thirty-five kings extend from *Tsan-da-thoo-vee-ya* to the last king, *Ma-ha-tha-ma-ta*, who reigned when the country was conquered by the Burmese. The *Arakan* kings in the interim, "if they have writ their annals true," carried their victorious arms into the valley of the *Ari-wa-ti*, to Siam, and even to China. The present *Arakan*

* Before their conversion to Buddhism, the *Myam-mas* had probably the same simple religious rites which we see among the hill tribes to this day, *i. e.* occasional offerings of food, flowers, &c. to the *Nats* or Spirits, placed in the open air. Indeed these offerings are still common throughout Burma, though they are disallowed by strict Budhists.

era corresponds with A. D. 639; from what event it was established is not mentioned, but I have been told that the former era having extended to many hundred thousand years, had become inconvenient for ordinary purposes, and therefore a new one was commenced.

The first king whose reign is calculated in the *Ra-dza-wang*, according to that era, is *Meng-Tsan-mwon*, who ascended the throne in 746, equivalent to A. D. 1385; before his time the number of years each king reigned is entered, but not the year of his ascent according to the era, though of course this is easily ascertained. His grand nephew, *Ta-tsan-phyoo*, who succeeded in 821, or A. D. 1460, had extensive possessions in Bengal. Coins of that date now exist with legends in the Bengalee and Persian character, as well as Burmese, some being struck by the viceroys in Chittagong, others in the name of the king himself. About a century later, the Portuguese appeared and attempted to conquer *Arakan*. I say the Portuguese, though the natives now call them *Angleit*, and I believe them to be no others than the English. But *Ang-leit* is, I think, an interpolation of the copyists of the *Ra-dza-wang* in later times; the invaders are first called *Bho-dau-thwe-pha-laung*, the first word being apparently a corruption of Portuguese, and the second a term of contempt towards foreigners, *pha-laung* being a provincial word for a tadpole. In the latest editions of the history, the white invaders in ships are called *Bho-dau-thwe-aung-leit-pha-laung*—i. e. Portuguese-English tadpoles.* The invasion by the Portuguese occurred in the reign of *Meng-bha*, and the same year a son being born to him, was known afterwards by the name of *Meng-pha-laung*. This king in A. D. 1610, (vide Marshman's *History of Bengal*,) joined with some Portuguese adventurers in invading Bengal, when they took Bulooa and Luckipoor. This event is also recorded in the *Ra-dza-wang*. In A. D. 1666, we learn from the *History of Bengal*, that Chittagong was lost to the Arakanese, they being defeated on the banks of the Tenny river by the Subadar of Bengal. After this defeat, the Arakanese were occupied with feuds at home; the old race of kings was deposed in 1124, or A. D. 1763, and different chiefs, one after another, took possession

* This term *pha-laung* is still frequently screamed after Europeans by children in the streets of *Akyab*, the little rogues then run off laughing heartily.

of the throne. At length the Burmese, on the invitation of *Than-dau-we*, who was the *Myo-thoo-ggee*, or head fiscal officer, invaded and conquered the country. The reigning king at that period was *Ma-ha-tha-ma-ta*, and his son *Re-bhau* is still living in *Amerapoor*.

In various parts of *Arakan* there are traces of a much more extensive population than it contains at present. The ruins of the ancient temple of *Maha-muni*, built entirely of stone, the sites of former cities shewn by the remains of tanks and ruined pagodas, the extensive stone walls at the old capital, certainly tell of a more flourishing kingdom than what the British found it; but we have no satisfactory evidence of the *Arakan* kings having subjugated Burmah and Siam, much less China! Of the conquest of a part of Bengal, we have credible historical evidence. At *Dacca*, I believe are still to be found the remains of a Bhudhist *dze-di*, or pagoda, which can only be attributed to the conquering Arakanese. The name *Tset-ta-goung*, of which Chittagong is a corruption, is Burmese, and the descendants of people of Tipperah brought hence from that country, still survive. There are also some villages of Shan descent, but those people were most probably brought from the Shan population, which is to be found located west of the river *Ara-wa-ti*.

The Burmese established their head-quarters at the old capital. For a few years their government was undisturbed, but at length rebellions were stirred up by an individual called by the English *King-lerring*,* who was the son of *Than-dau-we*, the *Myo-thoo-gyee*, who had first invited the Burmese into the country. Many of the Arakanese fled into the neighbouring British province of Chittagong, and thus quarrels arose on the frontier. At length the Burmese having provoked the British government by several acts of aggression, *Arakan* was invaded by the English, who accompanied by a number of the former inhabitants, conquered it with ease, and entered the capital May 1825, since which period it has been annexed to the British Indian empire.

Arakan is divided into 160 circles, of which 148 are denominated *kywn*, or islands, being situated in the low lands, and 12 are called *khyoung*, or stream, being in the hill districts. They contain a total of

* Properly *Khyeng-byan*, lit. "*Khyeng-return*," so called because he was the first-born after his father returned from the *Khyeng* hills. A son of *Khyeng-byan* died in *Akyab*, A. D. 1840.

960 villages. Each of these circles is placed under an officer, designated *kywn-aop*,* or *kyyoung-aop*, according to the locality of his charge. The duties of a *kywn-aop* are to collect the revenue, to preserve order in his circle, and to assist the police in the apprehension of criminals; through him are made all statistical inquiries, and to him are referred many disputes concerning land; he is paid 15 per cent. upon his collections. In each circle there are from 3 or 4 to 15 or 20 villages; the revenue collected by the different *kywn-aops* varies from 200 to 10,000 rupees: this great difference results from the rapid increase within a few years of some circles, compared with others, consequent on superior fertility of soil, more convenient locality for exporting grain, and other causes.

The office of *kywn-aop* is not hereditary, but the son of any man who has rendered essential services, generally succeeds on his father's demise.

Next to the *kywn-aop* is the *rawa-goung*, or village head. This officer is elected by the villagers themselves; if there are two or more candidates for the appointment, the villagers meet and sign their names to a document containing the name of him they vote for; these lists are then forwarded by the *kywn-aop* to the officer in charge of the district, (called *myo-woon*,) who appoints him that has the majority of votes, unless indeed there be some good reason for rejecting him. The people generally make a good choice; for the last three and half years I do not recollect more than one instance of such an election being disapproved. The *rawa-goung* collects the revenue of his village, and delivers it to the *kywn-aop*, who carries it to the government treasury. He is paid four per cent. on his collections. A village of thirty houses is entitled to a *rawa-goung*, that is, to a stipendiary one; if a village have a less than that number of houses, they pay their tax to a neighbouring *goung*, but if the villagers, as frequently happens, dislike this arrangement, and elect a *goung* of their own, the proceeding is confirmed, but they must pay him themselves. Their object then is to induce settlers to come among them, whereby their village may be raised to the privileged standard of thirty houses.

Under the orders of the *rawa-goung* is the *rawa-tsa-re rawa-tsa-gan*, or village scribe. He is paid two per cent. on the village

* This is pronounced as one syllable, *Kyok*.

collections. The appointment is usually held by the son or some relation of the *rawa-goung*. His duties are to prepare, under the orders of the *goung*, the village *sa-rang* or register, containing the name of each householder in the village, with the amount of tax demandable from him upon each item.

There are no agents of police in the villages; the village officers being held responsible for the preservation of order and the seizure of criminals.

Throughout the district there are six police stations, (thanahs,) at which the police ordinarily remain, until information being given by a village officer or other person, of any occurrence requiring their presence, they proceed to the spot. Nearly all communication in the district is carried on by water.

The European functionary in charge of the district is styled a Senior Assistant to the Commissioner of *Arakan*, (by the people *myo-woon*.) His duties are of the same nature as those of a Magistrate and Collector in India; he also tries civil suits, and hears appeals from the native Judge's court. There is also a Junior Assistant to the Commissioner. To conduct all revenue affairs, there is an officer styled *myo-thoo-gyee*, whose office under the Arakan and Burman governments was considered the most important in the country; he then apportioned to each circle the amount of revenue demanded by the government; his duty now is under the orders of the Senior Assistant, to superintend all the *hywn-aops*, and to inspect and report on the annual registers of their circles; the office still carries with it a great deal of importance in the minds of the people. This officer is paid a fixed salary, and resides at the chief town of the district. The revenue business is conducted solely by natives of the country, and the language of the records is Burmese. The judicial officers of the Magistrate's court are Bengalees, chiefly natives of Chittagong, it not having yet been found practicable to introduce the *Arakanese* into this branch of the public service. They are however active and energetic police darogahs.

There is a native civil judge styled *ta-ra-ma-thoo-gyee*, who tries all suits for sums not exceeding 500 rupees. Few cases in *Arakan* are for a larger amount than this. The language of the Civil Judge's court is Burmese. He holds his court at *Akyab*.

The chief town of *Arahau* now, is *Akyab*; it is situated at the S. W. extremity of the district; it was first occupied in the beginning of 1826, and consisted only of a few fishermen's huts called *Tset-twe*, the name by which the present town is still known to the natives. The old capital, which lies about 50 miles distant N. E. from *Akyab*, was abandoned on account of its unhealthiness. The site of *Akyab* was well chosen. It is at the mouth of the principal river of the country, the natural outlet for the produce of a vast extent of fertile land; the soil in the immediate vicinity is of a light sandy nature, unlike that of the interior, which is generally clayey; both the traditions of the people, the appearance of the surface, and the marine remains, proclaim the site to have been but lately redeemed from the sea. Shells are to be found near the surface in the streets of the town, and on the roads of the station; west of the station is to be traced a raised sea-beach, along which a road now runs towards the river *Ma-yu*, and between it and the present sea stretches a plain of more than a mile in extent; here tradition also points out where ships used formerly to be moored.* To the S. W. of the station is a ridge of sandstone rocks running nearly N. and S. some distance inland, and elevated in some places from 25 to 30 feet above the highest tides; to this height the rocks are perforated by marine animals. There is no tradition regarding any convulsion having raised this tract of country. The same effects are visible along the coast for 50 or 60 miles from *Akyab*. In the upper portion of the ridge of rocks above mentioned, no shells are to be found in the perforations, but lower down oyster-shells are still seen adhering to the rock. On the opposite shore of the *Akyab* harbour is a remarkable conical-shaped rock on the top of a little hill elevated above the water about 150 feet. It is stated, that in the reign of king *Thoo-re-ya-tseit-ra*, the water was so high, that this conical rock was only just protruded above the surface, and the king on the occasion of a war-like expedition, deposited there his hair comb as an offering, without moving from his boat; hence the rock is called to this day, *Oo-bee-gyap-toung*, "Head-

* *Akyab*, the name given to the present town by foreigners, is perhaps derived from the name of a pagoda built hereabouts, which was probably a good land-mark in former times, and therefore well known to mariners. The site of the pagoda is called *A-khyat-dau-kun*, "Royal-jaw-bone hillock," from a jaw-bone of *Gautama's* being buried there.

comb placing hill." *Akyab* is a very regularly built town ; the streets are broad, and all run at right angles to each other ; the houses are of flimsy materials, being built only of bamboo and canes of the *nipah* tree, but they are spacious and airy, and being elevated a few feet above the ground, are admirably adapted to the damp climate of *Arakan*. The population of *Akyab* does not exceed 5,000 souls, excluding some villages which form the suburbs.

The whole of the land of *Arakan*, whether forest, cultivated or fallow, is the property of the state ; but as it seldom happens that the state has cause to assert its claim, the great mass of land is transferred by sale from hand to hand, or inherited from generation to generation, like other property. Every man who purposes bringing waste land into cultivation, gives notice of his intention to the *rawa-goung* ; either that officer, or the cultivator himself if he pleases, informs the officer in charge of the district, and the land tax is remitted for two or more years, according to the nature of the soil, and the jungle to be cleared. Cultivation and occupation of land give a prescriptive right to a cultivator as long as he pays the Government demand upon it, but if he abandon it without entering into an arrangement with any body else to keep it in cultivation, or to pay the Government demand, he forfeits his right to it. The cultivator then has the possession, but not the property of the soil. By custom a distinction is made between rice land, and that which has been enclosed for gardens. If a portion of the former be taken for public purposes, a road for instance, the common law of the country gives the cultivator compensation ; but in the case of gardens, the owner is entitled to the value of every tree and shrub they contain ; all produce being *bona fide* his private property. Some cultivators make over their land to others for a year or more, if from any cause they are unable to cultivate themselves ; if their land be very productive, or have any peculiar advantages of position, they receive a rent for it from the sub-tenant which frequently equals the Government demand ; these arrangements among the people are not interfered with ; the former tenant's name remains in the village register, and he is responsible for the Government tax, unless he has formally given notice to the *rawa-goung*, that he is not going to cultivate. On the death of a cultivator, his land is inherited by his heirs in like manner as if it were

his own property ; the law of the people, whether Burman or Mahomedan, regulates the proportion which the heirs receive.

The mode of "settlement" of a village in *Arakan* is as follows:— During the month of February, by which time the crop is cut, and the grain for the most part thrashed out and winnowed, the *ra-wa-goung* gives notice to the cultivators that he is about to measure their lands ; he is accompanied by the village scribe, and the cultivators of the fields in the direction of which he is proceeding ; sometimes the *kywn-aop* is present, but not always ; in extensive circles he cannot personally superintend the measurements in all the villages.* The cultivator whose field is to be measured holds the bamboo, which is 12 feet long, and measures out the length and breadth of his field, which is then written down by the village *tsa-re*, hence the area is deduced and the village register prepared. Thus the *ra-wa-goung* goes through all the lands of the village. In the register is entered the name of each householder, his wife's name, (but the women are not so carefully registered as the men,) each lodger, and formerly every bachelor above the age of 18 years, together with the amount of tax due from them, whether for rice land, garden land, or capitation tax. To make a return of those persons subject to capitation tax, the *ra-wa-goung* must be acquainted with the age and condition of each villager, whether married or unmarried, a householder or lodger. This tax formerly extended to all males above the age of 18, who were deemed capable of manual labour ; but within the last year (1840,) this objectionable tax has been much reduced, unmarried youths wholly exempted from it, and the train laid for its eventual abolition.†

The village register being framed is delivered to the *kywn-aop*, who has received like registers from each village in his circle, and he delivers them into the *yon-dau*, (kucheree,) where they are compared with those of the past year ; if no doubts arise as to their

* The land measure now in use in *Arakan* was introduced from *Chittagong* in 1835. Up to that period the tax was levied not upon the area of cultivation, but upon the ploughs, each plough being estimated as equal to a *doon* of land. A *doon* contains 30,720 square yards, equal to a little more than six and a quarter English acres.

† A poll tax is not necessarily of that hateful nature generally ascribed to it, and certainly it is not so regarded in *Arakan*. We have an instance of a self-governed people voluntarily imposing this tax upon themselves. "In the state of Massachusetts, every male citizen, from 16 to 60, is subject to a poll tax, which is commonly a dollar, or a dollar and a half."—*Goodrich's Universal Geography*, Boston edit. p. 340.

accuracy, they are accepted ; if they appear incorrect, inquiries must be instituted through other channels than the village officers. Supposing them to be accepted, the *kywn-aop* then receives slips of paper, called *kyoung-hlya*, which are bills presentable to each tax-payer for the amount demanded from him, with a specification of the item of taxation for which the demand is made, whether for rice-land, garden-land, capitation, or the extent of his land by measurement, and the months in which each instalment is to be paid. No man can be called on to pay any tax without a bill for the amount, bearing the seals of the *myo-woon* and *myo-thoo-gyee* being presented to him ; the village officer must give a receipt on the back of the bill for each instalment paid. If a tenant be dissatisfied with the measurement of his land, and dispute the amount demanded in the bill, either a new measurement by the village officers is ordered, or, at the request of the tenant, a person unconnected with them is sent to remeasure the land ; the expence of this new measurement falls on the village officer if his outturn be found incorrect, or the cultivator if it be correct. The above process of registry and land measurement is continued yearly. It is not to be supposed that from so rude a people really correct survey of the cultivated area is to be obtained ; all that can be hoped for, is to procure a fair approximation to the actual amount.

The cultivated rice lands are divided into three classes, which pay at the rate of 12, 10, and 8 rupees per *doon*. The first sort will produce from one thousand to twelve hundred baskets of *dhan*,* which will sell on the average at from 10 to 12 rupees per 100 baskets. One man with a pair of buffaloes will cultivate a *doon* of land with ease ; the produce will fetch, in ordinary seasons, from 100 to 120 rupees ; the tax payable to Government therefore for this class of land is from 10 to 12 per cent. of the gross produce of the soil ; the profit from the second and the third class of lands is from 1 to 2 per cent. less than the above ; the cultivator thus realizes a handsome profit, and is certainly never distressed to make payment. I have never known a single cultivator a defaulter. The grain market has hitherto been a sure one ; the cultivator receives for his grain cash payment from the ship, which

* The basket of *Arakan* proper is much smaller than that of the Southern districts ; 100 of rice of the former are equal to about 30 Indian maunds.

anchors alongside the field that has grown the rice. It is principally exported to Madras, Coringa, and Masulipatam. A reference to table B will shew the rapid increase of the *Akyab* rice trade; we there see a population of less than 1,50,000 souls, growing and exporting grain to the value of eleven and a half lakhs of rupees. Only one rice crop is raised in the year. The tax on gardens is higher than that on rice land, being at the rate of 16 rupees per *doon*.

Wages in *Arakan*, compared with those of Bengal, are very high. For ordinary labour the people of the country cannot be hired at a less rate than four annas a-day, or if by the month, six rupees; though for some sorts of work they demand seven to eight rupees a month. In the reaping season, which generally commences in December, many hundreds, indeed thousands of coolies come from the Chittagong district by land and by sea, to seek labour and high wages. They are engaged by the Arakanese cultivators, and are generally paid at a certain rate for the quantity of rice cut down. If they work diligently, I am informed they can earn from four to five annas per diem; in their own country their labour for the same time would not bring them more than six pice, or at the most two annas. The Bengalee labourers are not much employed in ploughing the land; that work is performed in the rainy season (about the middle of June) at the commencement of which they for the most part return to their homes. They are beginning however to seek employment also in ploughing land. One great source of loss to the cultivators, is the frequent occurrence of a murrain among their cattle, by which thousands sometimes perish in a single year. In 1839-40 a sickness prevailed among the cattle, simultaneously with the *cholera* among the inhabitants, by which 16,000 head, cows and buffaloes, were carried off. The cattle are replaced from *Chittagong* and also from Ava. I have been much interested at witnessing the cheerfulness and determination with which a cultivator would set to work at his field by spade, after losing his buffaloes, worth perhaps from 40 to 50 rupees the pair, determined to labour hard in order to replace them as soon as possible.

A measure has lately been sanctioned by government for the whole province of *Arakan*, which is calculated to extend largely the cultivation of jungle tracts, and perhaps eventually alter the tenure of all land in the country. Rules have been passed for grants of large

areas, and they are so liberal in their terms, that they cannot fail to be successful. They confer leases in the first instance for periods varying from eight to sixty-four years, according to the nature of the land ; rent free for half the period of the lease, and at a low rate of rent for the remainder. The hereditary right to the soil is declared as long as the grantee fulfils the terms specified ; future leases for twenty years are guaranteed at a no higher rate than the average of that paid by adjoining government lands. The people do not yet sufficiently appreciate the advantages to be eventually derived from these grants, but they are gradually becoming more sensible of their value. Numbers of the descendants of those who fled in troublous times from their country, and settled in the southern parts of Chittagong, the islands of the coast, and even the Sunderbuns of Bengal, are gradually returning. Rumours of an attack from the Burmese have prevailed among them for the last three years, and retarded their return, but this alarm has now subsided, and during the N. E. monsoon, boats filled with men, women, and children, with all their worldly goods, may be seen steering south along the eastern coast of the Bay of Bengal, to return to the land their fathers abandoned 30 or 40 years before. They have told me, that in their exile the old men used to speak with regret for its loss of the beauty of their country ; the fertility of the land, which returned a hundred-fold ; the heavy ears of rice ; the glory of their ancient kings ; the former splendour of the capital ; the pagodas, and the famous image of *Gautama* now carried away, with which the fortunes of the country were indissolubly united. Who would have imagined that *Arakan* could inspire such sentiments !

It is a question of interest to consider how far the people of *Arakan* are satisfied with British rule. The mass of them are infinitely better off now as regards personal freedom, wants, and comforts, than they were under the government of their native princes or the Burmese, and they are doubtless sensible of the advantages they now enjoy. During the times of the *Arakan* kings, and the Burman governors, the people were not called upon to pay much in regular taxes, but there were constant calls on them for labour, for service, and for materials to make or repair the houses of the *kywn-aops* and other government officers ; besides which, the circles were obliged to furnish the public officers with followers for special duties ; the people therefore

had no certainty of the amount that would be demanded from them. *Arakan Proper*, after paying its own expences, or satisfying its local government, was required to furnish subsistence for the royal white elephant; this amounted to 120 viss of silver annually, or about Company's rupees 20,000. All the lands west of the river *Mayu* were set apart for the Tharawadi Prince, the present king of Ava. He appointed to them an officer, who remitted to Ava yearly the tribute due to the prince, which amounted to about 3000 rupees. Neither the *myo-woon*, nor any of the public officers received any fixed salary, but had fees upon all collections and customs, and a share of all fines imposed. Each buffaloe plough paid yearly 15 Burman baskets of *dhan*, equal to $10\frac{1}{2}$ maunds. Each bullock plough paid ten Burman baskets. There was also a capitation tax on each married householder. When the *myo-thoo-gyee*, and other officer was called to the court of Ava, the province had to pay the expences of his journey, as also of the journies of the *myo-woon*, and other officers appointed from Ava, on their coming to assume charge, likewise on their recal. A certain number of men were expected to take to Ava every year a beautiful flower peculiar to *Arakan*, which none but the royal family were allowed without permission to wear in their ears or hair; others were set apart for keeping the royal gardens in order; sixty were always to be at work at Ava, and had to be supported by the remainder of their number in *Arakan*; they were relieved annually.

These various calls upon their industry, the general poverty from stagnation of trade, and the flight of a large portion of the populace, together with nearly all the respectable families, made the condition of the people very wretched, and the contrast is infinitely in favour of the present state of things. But the upper classes do not participate in these congratulatory feelings to the extent that the lower do. They have regained their country, but not the high position they appear to have anticipated. They refer to the power they formerly had under their own kings; their being then allowed to hold slaves, who under our rule have been declared free; also the emancipation of the debtor slaves, who having pledged their persons were bondsmen to their masters, until they could repay the sums advanced.

The upper classes, and the literati, who are much respected, speak with regret of the neglect now shewn to pagodas and religious edifices,

which formerly were repaired by the government ; they declare there is a general decay of *dhamma-wat*, or virtue, among all classes ; less attention to religious duties and ceremonies, which they attribute to the governing power not setting the example ; to this neglect also is attributed cholera and sickness among cattle, which of late, have frequently visited the country. The *phoonggyees*, or priests, complain, that people are no longer constrained to respect in their presence the law, "thou shalt not kill," but catch fish in tanks near the monasteries with impunity.

When *Khyeng-byan* raised a revolt against the Burmese, (he was the son of the man who first invited them across,) all the most respectable families joined his standard, and finally they fled to the Chittagong district. These men on the breaking out of war between the Burmese and the British, offered their services, through Mr. T. C. Robertson, then Magistrate of Chittagong, to assist in conquering *Arakan*. Some of them were connections of *Khyeng-byan*, and relations of those chiefs who, in the latter times of the kingdom when the regular monarchs were deposed, had one after another seized the throne. Among these men, two of the most distinguished were *Oung-gyau-ri* and *Oung-gyau-stan*, the former a brother-in-law of *Khyeng-byan's*, rendered important services to the army of invasion ; the latter was a nephew of *Khyeng-byan's*, and a man of influence and ability. After the occupation of the country, these men were amply provided for, but appear to have cherished hopes that when the British army was withdrawn, the country would be made over to them, or at least to a native dynasty. Both were impatient of controul, and were convicted of exercising their authority with cruelty. One was removed from his office of *myo-thoo-gyee* on a charge of bribery and corruption, and the other being convicted of severely wounding a police darogah with a *dha*, was sentenced to seven years' imprisonment.

In less than two years after the occupation of *Arakan*, the establishment of a native dynasty was canvassed and plotted for, and these two men, together with nearly all the influential persons in the country, were privy to intrigues to compass that object. In December 1826, or January 1827, a grandson of *A-bha-ya*, a chief who had seized the throne and reigned for nine years before the Burman conquest, returned to *Arakan*. His father, named *Pa-tang-tsa*, had been carried to Ava

by the Burmese. The son of *Pa-tang-tsa*, named *Shwe-pang*, either had made his escape, as he averred, or been permitted quietly to depart the court of Ava, perhaps, hoping thereby to excite troubles in *Arakan*. Certain it is, that on his appearance, most of the headmen of the country were favourable to his claims, and attempts were made in April 1827, to tamper with the native officers and men of the Local Battalion. *Shwe-pang* was subsequently made a *kywn-aop*; the flame was smothered for a time, but the fire remained smouldering. Nine years after, the above named individuals were guilty of exciting a man, named *Kyeet-tsan-we*, to rise in arms; he commenced plundering the country, with the assistance of a band of escaped convicts, and other desperate characters, and some of the ignorant hill tribe, the *Khyengs*. He and his adherents were at length forced to fly into the Burman territory, whence they were brought back in the beginning of 1837, being given up by the Burman government.

This *emeute* was called *dakoity*, (gang robbery,) but the real object of the attempt was to seize the government of the country. The instigators were insane enough to believe, that the British government would be wearied out by their system of ravaging the country, and make it over to them on payment of a yearly tribute! Since this attempt, every thing has been very quiet. The English expedition to China has excited an intense interest among the *Ra-khoing-thas*, and as China is regarded as the first power in the world, the issue of the contest was held to be rather doubtful until the favourable result of certain magical calculations which were resorted to, when it was discovered to have been long ago foretold in certain books, that the English were destined to subdue China. There is in *Arakan* a village named *Ta-rouk*, the same name which the Burmese give to China. On going into the interior in January 1841, I directed my steps to this village first, in order to ascend a hill in the vicinity. The people were impressed with the belief that I was going there to have a mimic fight for the village, and order the inhabitants to come out and make their submission, as an omen for the success of the China expedition!

Within the last four years, great improvements have been made in *Arakan* taxes. It is difficult to account for such an impolitic and unjust system of taxation as existed up to 1836 ever having been proposed or adopted. Boats, nets of all sizes, cattle not used in agri-

culture : all trades, occupations, and callings had separate taxes upon them ; these have now been happily abandoned, and other taxes to the amount of nearly a lakh of rupees reduced, without any loss accruing to the state. The grants of land will raise up a new class in *Arakan*, viz. of extensive landholders with an hereditary right to their estates, whose interests will be bound to the British government.

Among the hill tribes I have omitted mentioning two, viz. *Kyan*, and the *Toung-mru*, of which only a few families exist. The former live on the *Kola-dan* among the *Ku-mis*, from whom they differ in some habits, but have the same general appearance. A few words of their language will be found in Appendix D. A few houses of the *Toung-mru* tribe are to be found in the upper course of the *Ma-yu*.

The hill tribes within the British territory, may as regards their relation with the government, be divided into two classes.

1st. Those who live near the plains, and are therefore entirely under the controul of the *Arakan* authorities.

2d. Those residing at a greater distance, and whose country is inaccessible for ordinary purposes.

The first are assessed at the rate of two rupees per annum for each cultivator ; the chiefs are answerable for the preservation of order in their clans, and must surrender all criminals to be tried by law. Slaves among these tribes have been emancipated.*

Among the second class, no inquiries are made regarding the number of cultivators, but the chief of the clan pays a fixed sum yearly in token of his fealty. The tribes of this class are not interfered with in their internal arrangements, but of course they are bound to abstain from all attacks on tribes within the British frontier, and indeed beyond it ; too frequently it is to be feared they join in the former, or furnish information which leads to them. They still hold slaves, and punish their own criminals in petty cases. It would be

* The chiefs complain of this as a great hardship. In a *Khyeng* tribe, I once met a young *toung-meng*, or chief, who had lost one of his fingers. It appeared that his slaves had one fine morning absconded, and he was obliged to set to work himself for his support in clearing forest land. By his clumsiness, he soon cut off a finger, and now he held up his mutilated hand to me, in dumb appeal for the restitution of his slaves. This young man was all but naked, and a blush was visible in his clear olive cheek, when the *Ra-khoing-thas* with me threw a cloth over him, and he heard for the first time in his life, that he was committing a breach of decency in appearing unclothed.

next to impossible to controul them on these points, as they are separated from the plains by too difficult and dangerous a country to be approached, except by an armed party. The hill tribes pay their quotas in cotton, ivory, and other raw produce. Tribute is paid by all tribes residing within the limits, in which the *Arakan* and Burman governments formerly exercised authority. Some of these know us by name as some dreadful beings, but have never beheld an European.

The hill tribes live a life of danger, struggle, and hardship. The chiefs indeed have an easy time of it, but the women are especially hard worked. The latter are scantily clothed, as much so, however, as precipitous hills and a warm climate render necessary; they are stoutly made, but diminutive in size; the generality not exceeding in height four feet six inches. The *Ku-mis* (men) are not smaller in stature than the Burmese, the *Khyengs* I think are.

The hill cultivation is called in Burmese *toung-ya*. It consists in clearing away the thick forest, and luxuriant shrubs and creepers, which clothe the mountain sides. After the large trees are cut down, what remains of the underwood is set on fire; the stumps of the large trees are left standing. This work is finished in April. The seed, whether rice or cotton, is then put into the ground, small holes being dug or scraped a few inches apart, with a sort of hand hoe. The crop is reaped in October.* What a hard and bitter life must these people live! Each year the same labour must be encountered, the same dense unyielding forest be cleared, and yet they know not whether they shall be there to reap the fruits of their toil, or be carried off in an attack as slaves to some more powerful tribe. Notwithstanding the noble trees which find sustenance upon the mountains, yet the soil is so unfavourable to grain, that it cannot be raised again, the people say, upon the same spot in less than from fifteen to twenty years. I am inclined to think, that this is chiefly in consequence of the rich surface soil, when deprived of its protecting trees and shrubs being washed down the steep hill sides by the heavy rains; it is not until brushwood has again appeared, and the soil been bound again by bamboo roots,

* Besides grain and cotton, the hill tribes grow tobacco and a few esculent vegetables, such as pumpkins, gourds, &c. These are planted in little valleys, or by the side of streams, on soil left dry after the rainy season.

(which spring up very thickly in two or three years after a hill side has been cleared,) that sufficient soil is accumulated to nourish grain. Each returning season, then, brings for these mountaineers the toil and hardship of a new clearing. They are unacquainted with the terrace cultivation of other hill countries; indeed the hills appear too precipitous for it to be practicable. Spots favourable for clearings are by no means plentiful. The people have sometimes to go one, two, or more days' journey from their village, in small parties here and there, to sow their grain. In these separate clearings, they erect temporary sheds, raised from fifteen to twenty feet from the ground, and remain there until the work is finished, when they return to the village, leaving perhaps two or three hands to watch the crop. These people instead of the high raised sheds commonly used, sometimes sleep at night up in trees, where they have made a convenient resting place with interwoven branches, and a few split bamboos bound together with strong creepers, which interlace these forests in profusion. This practice has perhaps given rise to the tale, that some hill tribes had no regular dwellings, but lived in trees, more like apes than men.*

After a village has remained in one site for two or three years, all the culturable spots in the vicinity are cleared and exhausted.† The

* The tree-living *Kukis*, represented to live in the hills and forests east of the *Chittagong* district, have attracted considerable attention. The whole account of their cannibalism and tree-dwelling I regard as fable. There may perhaps have been instances of some of these savage tribes offering human sacrifices. I have had intercourse with very "pretty savages" in the wild country bordering on *Arakan* to the E. and N. E; all of whom had comfortable houses, even the poorest of them far more roomy than the wretched hovels of Bengalee peasants; these savages had intercourse with other tribes beyond them, but had never heard of tree-living and human-flesh-devouring people, though they had plenty of wonderful stories to tell of Amazonian tribes, where male children were destroyed, and of others who by magic could make themselves invulnerable. But these best authority is that of the *Khyoung-thas*, men of Burman race, who live among the hill tribes, and are comparatively civilized. Some of these I have known who had been taken as slaves, and passed to distant independent tribes, and subsequently regained their freedom. These men had never heard of tree-living men. The name *Kuki* was unknown to all, but the same tribes are called by many names. The tale has, I suspect, been received from Bengalee narrators in the *Chittagong* district, and incautiously received as correct. What European can vouch for its truth?

† I know two cases, one beyond the British territory, where tribes had a wide range of territory, and jealously guarded against any clearing being made in it by other tribes. They have thus kept their villages on the same site for more than twenty years, or crops, for so they reckon time. One of these villages was perched upon a rock almost inaccessible, it was therefore a favourite position, one not easily surprised.

people must then look out for another home ; their village is abandoned, and forth they go, men, women, and children, two, three or more days' journey, to build their bamboo huts near some spot where they may raise food ; men and women may on those occasions be seen toiling up the steep hills, their conical baskets on their backs, fastened by a strap passing round the forehead ; in some their children sleeping contentedly, others containing their worldly goods. I have entered deserted villages, in which perhaps half the people's property, such as it was, had been left, until they could return and take it away at leisure ; there were baskets of rice, *dhan*, pounding mortars, cotton spinning and weaving machines. I have even seen spoons, the bowl rudely cut out of wood, and a bamboo handle lashed on. The cotton cloths these people weave are really excellent, the threads are coloured with various vegetable dyes, blue, red, yellow, &c. and are frequently woven into very handsome patterns.

The houses of the hill tribes are built entirely of bamboo in the walls, the supports, and the flooring. They are roofed with leaves of the same plant. The houses are raised on platforms, and from the steepness of the hills, oneside may be from twelve to fifteen feet above the ground, and being supported by bamboo props, not more than two inches in diameter, they look very slight ; but last well, with trifling repairs, for three years, the general period for which they are required. The chief's house usually consists of a spacious hall, extending right across the dwelling, in which the feasts are held, and where is always a large hearth of plastered mud, on which a whole ox might be roasted ; on either side of the hall are separate rooms for the different members of the family, the unmarried sons and daughters. The houses of the people of course are not on such a large scale as the chief's, but they are spacious ; two families sometimes live together, in which case they ordinarily cook and eat separately.

The villages consist of from twenty to forty, or fifty houses, which are built as regularly as the nature of the ground will admit. The rapidity with which these people will run up a bamboo hut is surprising. Journeying in the hills, I have come to halting ground for the night, fifty *Ku-mis* with their *dhas* leap into the bamboo forest, which resounds with the sharp strokes of the *dha* in rapid succession, and forth they come, dragging the slender stems after them in bundles of eight or ten.

These are cut to the required size for the platform and roof supports, split and crushed for the walls and floor; the leaves formed into slate-like pieces, bound with battens; thin strips are cut to tie the whole fabric together, and in less than an hour, out of the confused rush of fifty dark forms, each has found his proper place and work, and there stands a comfortable house, which will shelter one from a severe storm, should it appear.

The villages of the remoter tribes are generally built on the tops of hills not easy of access; in these situations there is a scarcity of water for six months in the year, and the people are obliged to descend daily to the lowest dells for that necessary of life. These villages are invariably stockaded, and the ground in the vicinity thickly studded with sharp bamboo spikes, to prevent the approach of foes; they are as hard as iron, and to bare-footed men are a great hindrance, especially in the night time. The tribes somewhat within our border, have abandoned or neglected this system of stockading their villages, and unfortunately some of them have suffered severely; but no tribe within our border has attacked another so situated since April 1837.* Different clans of *Ku-mis* attack each other; there is a feeling of jealousy between clans of the same tribe living upon different streams, and those clans of *Ku-mis* living beyond the British frontier, consider those within as fair game. Their native arms for attack and defence are spears, bows, arrows, and square leathern shields, about three and a half feet long, by two feet broad. Even the most distant tribes now possess muskets and ammunition, which are conveyed up the *Kola-dan* by petty merchants, and thence passed from tribe to tribe far into the interior. They use poisoned arrows in the chase, but I think not in war.

One grand necessary of life—salt, the remote tribes have great difficulty in procuring. The *Ku-mis* of the *Kola-dan* procure it and salt fish from *Akyab*; among them it is plentiful. The tribe living higher up the *Kola-dan*, beyond the British frontier, receive a good deal from Cox's Bazar, through the *Khy-oung-thas*, living in the hills east of *Ramoo*. Some tribes further removed, and isolated by savage feuds, cannot procure salt at all times, so content themselves with an

* When a terrible slaughter was made of a *Khyeng* village on the *Le-myo*, by a *Kumi* chief of the *Kola-dan*.

alkali, which they have the ingenuity to obtain by the combustion of bamboo. Powerful outside clans frequently force supplies of salt and gunpowder from their inner and weaker neighbours.

The great art of war among the *Arakan* hill tribes is, to fall on the enemy by surprise. If they are discovered before reaching a village of attack, they effect a retreat. An open advance in day-light is utterly inconsistent with their ideas of warfare. Before starting on an expedition, they send trusty spies to ascertain the best mode of approach; numerous are the feasts and ceremonies practiced to propitiate the spirits of the mountain; then they march, four, five, or six days' journey, and burst upon the devoted village an hour or two before dawn. These attacks are sometimes made through revenge, the consequence of feuds existing for many years; but generally the great object is to take prisoners who may be made slaves, women, and children therefore are captured; the men are generally slaughtered without mercy; they would be too troublesome to keep. The prisoners are sold from tribe to tribe. I have sometimes been fortunate enough to recover *Khyeng* women and children, poor creatures who had been carried from their original homes amidst the *Yu-ma* mountains, about two hundred miles. This appeared a very world of distance to them, in a mountainous country, where communication is so difficult. The *Khyeng* women have their faces tattooed in a remarkable manner, and being the only tribe who follow this custom, they are easily recognized amidst other people.

I need scarcely remark, that none of the hill tribes are acquainted with the use of letters. A few words of their languages will be found in Appendix D. They are the same as those published in the "Comparison of Indo-Chinese languages," by the Rev. N. Brown of Sudya, in the *Journal of the Asiatic Society* for December 1837. Separate clans of *Ku-mis* and *Khyengs* differ from each other in their words for some objects.

On the tribe called "Lung-khe."

On the upper course of the river *Kola-dan*, and generally located to the west of that river, beyond the British frontier, there exists a tribe called by the *Ku-mis* and *Ra-khoing-thas*, *Lung-khe*. They

are sometimes called *Boung-ju* and *Boung-jwe*. It is this extraordinary variety of names given to one and the same people, that leads to so much confusion, and causes so much difficulty in attempting to classify the different tribes. Another difficulty is, the inability of these people to give any connected account of themselves. The most that can be done, is to treasure up what they incidentally let fall, and draw inferences from it; to gain a knowledge of them by direct questions is almost hopeless, for they will give different answers to the same questions day after day, not I conceive from any wish to deceive, but from ignorance, and inability to reflect.

In my inquiries concerning the *Lung-khes*, I learnt sufficient to make it appear probable, that the *Lung-khes* and *Boung-jwes* were originally separate tribes, who had been conquered and reduced to slavery by a third. Their present *toung-meng*, or chief, is named *Leng-kung*, and he describes himself as belonging originally to a very powerful tribe to the N. E. of his present seat; his clan in that tribe is named *Hlaing-ji-u*, *Hlaing-chou*, *Hling-ju*, and *Hleng-tchy*.* Several generations back, a portion of his clan coming from the N. E. subdued the *Lung-khes* and *Boung-jwes*, and though still retaining intercourse with his ancestor's nation, yet his dialect, he states, has become changed. The nation from which he is descended, is called by the *Ku-mis*, *Tsein-du*, or *Shin-du*, a corruption probably of the clan-name *Hling-ju*, but as the *Ku-mis* use the term for the whole people, I shall adopt it with the same signification in this paper. I could not discover from the *Lung-khe* chief, that they had any generic name for the whole people. In speaking of the *Tsein-dus*, he used the term *Que-sak*, which he said signifies in his tongue, "upper people," or people living in the upper country; while he and those of his clan, who separated, as above described, are called by the *Tsein-dus*, *Que-tang* or *Que-plang*, i. e. "people living lower down;" referring either to the course of streams, or to the diminished elevation of the hills. The *Ku-mis* have a great dread of the *Tsein-dus*.

I must proceed to narrate how I first met the *Lung-khe* chief, for he formerly lived in independence beyond the British frontier.

* I heard these four pronunciations given for the clan-name, by *Leng-kung* and his brother.

In October 1838, the village of *Hleng-kreing*,* a powerful *Kumi* chief of the *Kola-dan*, was attacked by the *Lung-khes*. The attack took place in the dead of the night, and the surprise was complete. Between thirty and forty persons were killed in the village, and thirty-eight women and children were carried into slavery. This attack was headed by *Leng-kung*, a young man of 23 or 24 years of age. A party of the *Arakan* Local Battalion was sent in pursuit of the *Lung-khes*, but they abandoned their village, and fled with their captives into the hills, where it would have been useless to follow. In December of the same year, I proceeded up the *Kola-dan*, to make inquiries regarding the assailants, and found they had abandoned the site of their village, and gone westward with their prisoners, putting themselves under the protection of a *Kyoung-tha* family, living within the hill boundaries of the *Chittagong* district.† Being assured of this by persons whom I sent to ascertain the fact, I addressed the Magistrate of *Chittagong*, who recovered no less than thirty-three women and children that had been captured in *Hleng-kreing's* village; these were restored to their homes; one among them being the chief's daughter; two had been killed in retreat, and three sold to the *Tsein-dus*.

Shortly after their recovery, *Leng-kung* himself, and his elder brother *Leng-hung*, came down to *Akyab* to answer for their misdeeds. *Leng-kung* so far from denying that he headed the attack, gloried in it, averring, that "thirty years before, *Dha-boing-gyee* had attacked his tribe, killed a number of men, carried off several captive, and dug up his grandfather's bones,‡ plundering the grave of the various implements of war and state, which are always buried with a chief." This sacrilege the young man declared he had been brought up to avenge, and his eyes gleamed with delight as he told of his success! An elder brother accompanied him to *Akyab*, but the younger, from his superior energy and ability, possessed all authority in the tribe. From *Leng-kung* I

* This chief is generally called *Dha-boing-gyee*, a title of one of the officers of state under the *Arakan* kings, which he has assumed.

† This *Ky-oung-tha* family, the present head of whom is named *Thak-tang-phyoo*, emigrated from *Arakan* about 60 years since.

‡ The *Lung-khes* and *Tsein-dus* bury their dead, differing from the *Ku-mis* in this respect, who burn them.

learnt the following particulars regarding the *Lung-khes* and *Tsein-dus* :—

“ The *Lung-khes* subject to me, amount to three hundred houses ; they are all my slaves, except the immediate members of my family ; we live in bamboo houses like the *Ku-mis* ; we receive iron from the *Tsein-dus*, and salt from the *Ku-mis* ; our cultivation in the hills is *toung-ya* like theirs ; our language and that of the *Tsein-dus* is nearly alike ; we possess cows, pigs, goats, cats, and fowls ; we bury our dead ; the corpse is placed in a sitting posture, with a pipe in its mouth, food by its side, and *kung* ;* besides these a *moung*, (Burman gong,) sword and spear, together with the feathers worn in the hair by men of rank.

“ We worship four *Nats*, (spirits,) who are called *Que-sing*, *Sur-par*, *Put-ten*, and *Wan-chung* ; *Sur-par* is the head *Nat* ; he lives in the sky, and so do the others. There are cities in the sky where the dead men live ; there are many countries there, where trees bear food ready cooked, and clothes, and all things necessary. If men do not worship the *Nats*, when they sicken they die ; we worship once or twice a-year in the village, by sacrificing a buffalo, or pig, and drinking *kung* ; we do so to benefit ourselves, our wives, and children, and that no sickness may arise ; in the cultivation we have another sacrifice of goats and pigs to the *Nats* of the earth and water ; there are no names for those *Nats* ; for them we kill a fowl and throw it into the water, and leave meat or rice exposed on the ground. All men sacrifice for themselves, but we have *tsha-yas*, (instructors,) who at festivals are the first to bring the *kung*, and adjure the spirits. What they say I do not understand ; only a *tsha-ya's* son can succeed him. They have nothing to say to marriages or funerals. In marriages, the father and brother of the damsel are presented with clothes, brass ornaments, cattle, &c. A great feast takes place. I (*Leng-kung*,) gave the value of thirty cows for my wife. A son can marry his father's inferior wife, after the father's death. A chief can marry as many wives as he pleases. When a woman of rank dies, a cow is killed and eaten, and the people drink and dance ; she is buried in a grave lined with stones, and sometimes valuables are buried with her ; not always ; we do not practice witchcraft, but other people around us do. A man's life when he dies,

* An intoxicating drink.

goes to the sky ; all men, whether good or bad, go there. Our fathers who have gone before, we see in dreams, and they see us."

I learnt from *Leng-kung* some particulars respecting the *Tsein-dus* nation. It consists of the following clans :—

- | | |
|------------------------|-------------------------|
| 1. <i>Tjin-dza</i> ,* | 8. <i>Ting-lhoul</i> , |
| 2. <i>Za-tang</i> , | 9. <i>Ti-a-dai</i> , |
| 3. <i>Keng-lot</i> , | 10. <i>Rul-bu</i> , |
| 4. <i>Lhon-shin</i> , | 11. <i>Boi-kheng</i> , |
| 5. <i>Til-teng</i> , | 12. <i>Chung-ngla</i> , |
| 6. <i>Rwol-lweng</i> , | 13. <i>Hlaing-ju</i> . |
| 7. <i>M'lhul</i> , | |

This last clan the *Lung-khe* chief originally belonged to ; there are still some villages of it, he said, remaining among the *Tsein-dus*.

The *Tsein-dus* observe the same ceremonies in burying their dead that have been mentioned above. Their country is very extensive, fifteen days' journey, my informant said, from one end to the other.† There are several hundred villages of them. The village sites are not moved periodically like those of the *Ku-mis* and *Lung-khes*, for much of their cultivation is in elevated plains, and comparatively broad valleys, which admit of continued cultivation ; they work with hoes or spades, not ploughs ; they have not so much cotton and rice as the *Ku-mis*, but a greater variety of vegetables, as yams, pumpkins, &c. They manufacture their own salt from brine springs existing in their country ; the salt, said my informant, "is like stone, white and somewhat bitter in flavour ;" to obtain it, they boil the brine in iron vessels, which they obtain from the province of *Yan* in Burmah. No salt is obtained from bamboo ; in fact my informant declared positively there were no bamboos in the *Tsein-du* country, a statement scarcely credible ; the houses are built entirely of plank ; the roofs are of plank for great men, but the poorer classes use grass ; men chiefly perform field labour ; the wives of very poor men only perform out-door work. The religious notions of the *Tsein-dus* correspond with those of the *Lung-khe* chief.

* The head of this clan is *Van-u*, whose sister named *Terh-rhal*, *Leng-kung* married.

† I have been informed that *Kumi* tribes bordering on the *Tsein-dus* have heard from them of white foreigners far to the North, to whom some of their clans paid tribute. The country these clans paid to, they called *A-syn*. It can scarcely be Assam ; they may probably mean Cachar. But it is certain that they are acquainted with the fact of Europeans having possessions to the north of them.

The *Tsein-dus* receive from the province of *Yan*, ponies and horned cattle. When *Leng-kung* and his brother first arrived at *Akyab*, they were dressed in handsome silks procured through the *Tsein-dus* from *Yan*. The former wore also a tiara of dark feathers, his distinguishing mark as chief.

Since writing the above, I have received accounts of the death of *Leng-kung*, supposed to have been caused by poison administered to him; such is the story of the hill people. Certain it is, however, that the *Tsein-dus* marched to revenge his death, and plundered a *Khyoung-tha* village on the *Chittagong* frontier in May last. Endeavours are now being made to recover the *Khyoung-tha* prisoners from the *Tsein-dus*. On the death of *Leng-kung*, his tribe dispersed; his imbecile brother will not be able to keep the people together, and they will probably become incorporated in other tribes.

I abstract from various Tables furnished to me by the author of the above interesting report—returns, as follow, showing the high progressive prosperity of *Arakan* within the few past years:—

The Revenues of Arakan were,

							<i>Rupees.</i>
In 1832-33,	...	...	...	...	...	...	2,48,569
1833-34,	...	...	...	...	...	...	2,80,304
1834-35,	...	...	...	...	...	...	3,10,168
1835-36,	...	...	...	...	...	...	2,87,016
1836-37,	...	...	...	...	...	...	3,26,293
1837-38,	...	...	...	...	...	...	3,35,731
1838-39,	...	...	...	...	...	...	3,80,287
1839-40,	...	...	...	...	...	...	3,79,809
1840-41,	...	...	...	...	...	...	3,79,697

Since 1837-38, taxes on forest produce, huts, boats, houses, sugar presses, handicraftsmen, bachelors, &c. &c. (which prevailed as part of the ancient revenue system of *Arakan*,) had been abolished to the extent of 97,349 rupees a-year; the beneficial effect of this measure is shewn in the enhanced revenue, and trade of the province. In 1834-35, the number of square-rigged vessels which cleared out from *Akyab* was 140; in 1840-41, it was 709; in the first named year the tonnage was 16,000 tons; in the last noted 82,111 tons. In 1834-35, rice to the extent of 4,25,040 maunds, valued at rupees 1,73,636 was exported from *Akyab*. The rice exports in 1840-41, were from the same port 26,54,298 maunds, and their value rupees 11,42,187. I have returns for the intermediate and some preceding years, but give these as years of fair comparison.

English.	Burmese.	Lung-khé.	Koladan Koo-mf.	Mee Koo-mf.	Kyó.	Lémyó Kyíng.	Doing-nak.	Mrúng.
Air,	lè,	hlé or khlé,	A-lí,	ka-lí,	Alí,	khyí,	bó,	nau-bá.
Ant,	paynetseik,	nghet-té,	Pa-leng,	ma-ling,	ma-tsi,	pa-lein-tsa,	—	—
Arrow,	myá,	lee,	tá-i,	tsa-kó-i,	—	khá,	lé,	lé.
Bird,	nghet,	wá,	tó-ó,	ka-wá,	wá,	bó hau,	—	hó.
Blood,	thwé,	atí,	t'hí,	a-tí,	t'hí,	a-tí,	—	—
Boat,	hlé,	laung,	p'laung,	mí-laung,	p'laung,	laung,	nó,	rúng.
Bone,	ayó,	a-rú,	a-hók,	a-kú-náng,	rú,	mwé-hau,	ar,	ba-kre,
Buffalo,	kyué,	ná,	pa-nó,	ma-ná,	cha-láwé,	nau,	mó-it,	ma-shí.
Cat,	kyauung,	sí-yó,	mí-yaung,	nim-bó-i,	mí,	mím,	bí-lá-í,	a-mí.
Cow,	nwá,	tchó,	tsí,	kha-bó-i,	char-rá,	shyá,	gó-rú,	ma-cháu.
Crow,	kyí,	lang-á,	ú-ák,	m'kyí, & wá,	wut,	áng-ô,	ko-bá,	tuk-quá.
Day,	né,	sún,	kan-ní,	a-hóng-nát,	—	ta-ní,	din,	tsa-ló.
Dog,	khwé,	wí,	wí,	ú-í,	bú-í,	ú-í,	kú-gúr,	tchái.
Ear,	ná,	huá,	kun-nó,	ka-ná,	ná,	hnó,	kán,	kúng-jú.
Earth,	myé,	w'lé,	ku-lóng,	lé-kóng,	ní,	teit.	—	—
Egg,	ú,	wat-tí,	ku-dú-í,	a-dú-í,	a-twí,	a-tú-í	—	—
Elephant,	sheu,	tsáí,	kus-á-í,	ku-shá-í,	sang-hung,	mwí,	—	—
Eye,	myetsé,	mik,	a-mík,	a-mí,	mé-tó,	mí-ú-í,	sóp,	ma-quá.
Father,	a-phé,	ká-phá,	Nga-á-í,	pha-á-í,	bá,	bó,	báp,	a-bhá.
Fire,	mí,	mé,	ma-í,	má-it,	—	mí,	a-gú-in,	—
Fish,	ngá,	ngá,	ngó,	mwé,	ngwáu,	ngó,	máit,	a-á.
Flower,	pan-bwen,	pár,	ka-shong,	a-pá,	pá,	pa-pá,	—	—
Foot,	khyé,	ké,	a-kók,	a-kauk,	pát,	ashí,	teng,	ya-kóng.
Goat,	sheik,	kél,	mé-é,	sú-bé,	ké-rát,	mé,	sa-gol,	pún.
Hair,	shaben,	tsám,	tchán,	a-sháng,	tchán,	sáng,	súl,	buk-ka-nái.
Hand,	let,	kut,	kók,	a-kú,	qué,	kúth,	hát,	yák.
Head,	ghaung,	lú,	hlú,	a-lú-a-sán,	lú,	lú, lú-gú,	tsir-rá,	bó-kráo.
Hog,	wet,	wok,	áu,	áu,	wet,	wut,	sú-gur,	wá.
Horn,	khyo,	a-kí,	tug-gí,	a-tá-kí,	yu-é,	a-hyí,	—	—
Horse,	myen,	ráng,	kaung-ó,	ka-phúk,	shá,	tsá,	gó-ra,	go-rá.
House,	eing,	eing,	úm,	eing,	ing,	eing,	gur,	náo.
Iron,	than,	tír,	ta-mó,	ka-dáng,	ki-ying,	htí,	ló-á,	tchó.
Leaf,	yuet,	ting-nhá,	tchaung-ngam,	la-káng,	ting-ka-nú,	tein-tshoinghá,	—	—
Light, (dawn),	len,	qué-dé,	kú-wang,	kun-ní,	kwé-wá-tá,	a-wá,	—	—
Man,	lú,	má-nún,	kú-mí,	kú-mí,	ma-shí,	kyáng,	mo-rót,	tsa-lá.
Monkey,	myauk,	yaung,	kú-láit,	ka-lá-í,	ró-á,	yaung,	—	—
Moon,	lá,	hla-pá,	ló,	slú,	kyá,	khro,	thán,	tá.
Mother,	amé,	ka-nú,	na-o-í,	nwé-í,	núng,	nú,	má,	a-mó.
Mountain,	taung,	kláng, sláng,	mú-é,	ta-kúng,	hláng,	kón,	mú-rá,	lái.
Mouth,	uhók-payát	a-ká,	la-baung,	úk-khá,	ma-kás,	a-hmaung,	—	—
Musquito,	khyeen,	mur-song,	cháng-rang,	kháng-tsá-áng	sa-nung,	hau-bau,	—	—
Name,	námé,	m'núng, a-ming,	a-mún,	náng-pá-mé,	—	ná-hmé-ú,	—	—
Night,	nya,	yan,	wúm,	ma-kúng,	kul-lók,	tseit-yón,	ráit,	hur-ró.
Oil,	tsí,	tsí,	a-tauk,	tsa-ting-twí,	chú-rúp,	tsí,	—	—
Plantain,	nghet-pyo,	bal-lhá,	kút-tí,	kú-ti-teing,	kyá-lú,	hnám-bó,	ko-lá,	—
River,	myít,	tí-wá,	yáng-páng,	ta-ghá,	tí-póe,	hau-laung,	gáng,	tei-bú.
Road,	lán,	lám,	lám,	láng,	lám,	láng,	—	làn.
Salt,	shá,	she-té,	pa-ló-í,	ma-lwé,	ma-tsi,	ma-tsi,	—	—
Skin,	tha-yé,	sa-win,	mó-e-pik,	a-muí,	mé-wan,	nau-wan,	—	—
Sky,	mó,	wán, wyn,	ka-ní,	quein-nú,	mí-tsúk,	né-bí,	—	—
Snake,	myué,	rúl, rúi,	pú-wí,	ma-quí,	mí-yúk,	pwá,	tsáp,	tsé-bú.
Star,	kyé,	ár-fwí,	kus-shí,	a-sí,	ar-shí,	áá-shin,	ta-rá,	hán-dô-grí.
Stone,	khyauk,	lúm,	lóng-tchóng,	ka-lung,	lúng,	lúm,	sil,	kú-laung.
Sun,	né,	ní,	ka-ní,	kan-ní-ta-lúp,	nê-tchú,	ko-nhí-ó	—	—
Tiger,	kyá,	tchek-ké,	tuk-káe,	ta-gá-in,	kích,	kyé,	—	—
Tooth,	thwá,	há,	hó-ó,	a-phá,	há,	a-hó,	—	—
Tree,	thit-pen,	ting,	a-kúng,	ta-góm,	úng,	teing,	gá-ít,	ba-páng.
Village,	yuá,	qwá,	a-wung,	wáng,	kó,	náng,	para,	—
Water,	yé,	tí,	tú-í,	tú-í,	tú-wé,	tú-í,	páoní,	tei.
Yam,	myák-khaung,	burh-rá-rátáung,	ho,	khá,	pát,	bwá,	a-lú,	htá.

Table of Proportional Logarithms. By Captain ROBERT
SHORTREDE.

The accompanying is a Table of Proportional Logarithms, which I have lately constructed with a view to diminish their size, and at the same time considerably extend their use.

Proportional Logarithms are commonly arranged in vertical columns of 60 each, and the construction is such, that the larger the Logarithm the less is the corresponding quantity. I have never been able to perceive any great benefit resulting from such a system, but often I have felt much inconvenience from the want of an arrangement analogous to that of Tables of common Logarithms.

The present is a specimen of what I conceive to be the most convenient form of Table. The Logarithms here given are the arithmetical complements of those in common use,* so that they increase along with the quantities to which they belong, and the arrangement is such, as to retain the advantages of the decimal as well as the sexagesimal subdivision. The Table was intended primarily to facilitate the finding of proportional parts for minutes and seconds, in a set of Tables in which the quantities were tabulated for every 10, and it was immediately obvious, that it would serve equally for seconds and decimals when the quantities are tabulated, as in Hutton's Tables, to every minute, and generally for any quantities whose subdivisions are by 6, 60, or 600, &c.

The column marked ' " contains minutes and even ten seconds from 1 to 9'.50. The col. marked N contains $\frac{1}{10}$ th of the seconds in the former; the odd integers being found in the head line of the Table exactly as in Tables of Common Logarithms. The column marked *common difference*, gives the mean value at the middle of the line opposite which it stands: and beyond this are proportional parts for the decimal subdivisions of the mean common difference.

The use of the Table is very simple. The fractional part of 10' or 1' being found in the proper column (' " or N, as the case may be) take out the corresponding Logarithm; to this add the log. opposite the Tabular Difference found by column N; the sum of these is the logarithm of a number which found in column N is the proportional part required.

* If the term Proportional Logarithms be considered as being already definitively appropriated otherwise, those here given may be called Co-proportional or Arco-proportional Logarithms, or Anti-proportional, or Proportial, or Correctional, or any other term which may be preferred.

Example.—The Table Diff. for 10' being 461, required the proportional part for 4' 10".

Opposite 4'.10" (column' ") is the logarithm, 6198

Opposite 461 column N. is 8355

The sum is, 5053

The next less log. in the Table is 5051, corresponding to 192, and for the difference 2, the table of proportional parts gives .1, hence the whole proportional part is 192.1.

Required the log. sin. and tan. of $22^{\circ} 27' 37''.3$, using Hutton's Tables.

For 37.3 Proportional Log. is, .. 7936			Tab. Diff. for tan. 3579 P.L. 7936		
For 3056 the Tab. Diff. for sin P.L. 7069			Tab. Diff. for tan. 3579 P.L. 7756		
N 1899.6 5005			N 2225 5692		
Log. sin. $22^{\circ} 27' = 9.581\ 9236$			L tang. 616 1514		
Log. sin. $22^{\circ} 27' 373'' = 9.5821\ 135.6$			9.616 3739		

It very often happens, that the correction for 2d difference is omitted, though it may be sufficiently large to affect the result. To make this correction as little troublesome as may be, I have prefixed a set of decimal factors, which multiplied by the second difference will give the correction to be applied, with a sign opposite to that of the 2d difference. For example in Hutton's Tables, the log. sin. of $22^{\circ} 27'$ has a 2d difference of 3. The coefficient for 2d difference at 37.3 is .119, this multiplied by 3 is .357 or .4; which *added* to the result above found, gives 9.5821136 as the log. sin. of $22^{\circ} 27' 37''.3$.

The Table here given has no indices. The want of them may be supplied by the following Rule. When the fractional part of 10' for which proportion is required is between 10' and 1' the result is greater than $\frac{1}{10}$ of the Tabular Difference, when between 1' and 6'' the result is between $\frac{1}{10}$ and $\frac{1}{100}$ of Tab. Diff.

When the Tab. Diff. is for 1', then between 1' and 6'' the result is greater than $\frac{1}{10}$ of the Tab. Diff. and similarly in other cases.

P.S.—In using this Table to find the Logistic Log. for 1 hour, the fractional interval is to be reduced to decimal of minute, and found in column N.; the Logistic Log. is the arithmetical complement of the rithm in the Table. And similarly, if the whole term be 3 hours.

reduce as above and divide by 3. Also for 12 hours, reduce to decimal of hours and divide by 2 (for 24 hours divide by 4); the qualities being thus brought into tenths of hours, col. N. will serve as before, the arithmetical complement of the Tabular Log. being the Proportional Log. of the usual sort, to which apply if need be, the proper index.

R. S.

Coefficient for Δ .	Proportional Logarithms for 10 minutes : as also for 1 minute, or 1 degree, or 1 hour.											Common Differences.	Proportional Parts.									
	N.	0	1	2	3	4	5	6	7	8	9		1	2	3	4	5	6	7	8	9	
.045	1-00	6	0000	0072	0142	0212	0280	0348	0414	0479	0544	0607	67	7	13	20	27	34	40	47	54	61
.052	10	7	0669	0731	0792	0852	0911	0969	1027	1083	1139	1195	53	6	12	18	25	32	39	45	52	59
.058	20	8	1249	1303	1357	1409	1461	1513	1563	1614	1663	1712	52	5	10	16	23	30	36	43	49	56
.064	30	9	1761	1809	1856	1903	1950	1996	2041	2086	2131	2175	46	5	9	14	21	28	35	42	48	55
.069	40	10	2218	2262	2304	2347	2389	2430	2472	2512	2553	2593	42	4	8	12	17	23	29	35	41	47
.075	50	11	2632	2672	2711	2749	2788	2825	2863	2900	2937	2974	38	4	8	11	15	19	23	27	31	35
.080	2-00	12	3010	3046	3072	3118	3158	3188	3222	3257	3291	3324	35	3	7	10	14	17	21	24	28	31
.085	10	13	3358	3391	3424	3457	3490	3522	3554	3586	3617	3649	32	3	6	10	13	16	20	23	27	30
.090	20	14	3680	3711	3741	3772	3802	3832	3862	3892	3921	3950	30	3	6	9	12	15	18	21	24	27
.094	30	15	3979	4008	4037	4065	4094	4122	4150	4177	4205	4232	28	3	6	8	11	14	17	20	23	25
.098	40	16	4260	4287	4314	4340	4367	4393	4420	4446	4472	4497	26	3	5	8	11	13	16	19	21	24
.102	50	17	4523	4548	4574	4599	4624	4649	4674	4698	4723	4747	25	3	5	7	10	12	14	17	20	22
.105	3-00	18	4771	4795	4819	4843	4867	4890	4914	4937	4960	4983	24	2	5	7	10	12	14	17	19	21
.108	10	19	5006	5029	5051	5074	5097	5119	5141	5163	5185	5207	22	2	4	7	9	11	13	16	18	20
.111	20	20	5229	5250	5270	5293	5315	5336	5357	5378	5399	5420	21	2	4	6	8	10	12	15	17	19
.114	30	21	5441	5461	5482	5502	5523	5543	5563	5583	5603	5623	20	2	4	6	8	10	12	14	16	18
.116	40	22	5444	5463	5482	5502	5521	5540	5560	5579	5598	5617	19	2	4	6	8	10	12	14	16	17
.118	50	23	5836	5855	5873	5892	5911	5929	5948	5966	5984	6002	19	2	4	6	8	9	11	13	15	17
.120	4-00	24	6021	6039	6057	6075	6092	6110	6128	6145	6164	6180	18	2	4	5	7	9	11	12	14	16
.122	10	25	6198	6215	6232	6250	6267	6284	6301	6318	6335	6351	17	2	3	5	7	9	10	12	14	15
.124	20	26	6308	6325	6342	6358	6375	6391	6408	6424	6440	6456	16	2	3	5	6	8	10	12	13	15
.126	30	27	6532	6548	6564	6580	6596	6612	6628	6643	6659	6675	16	2	3	5	6	8	10	11	13	14
.128	40	28	6690	6705	6721	6736	6752	6767	6782	6797	6812	6827	15	2	3	5	6	8	9	11	12	14
.129	50	29	6842	6857	6872	6887	6902	6917	6931	6946	6961	6975	15	1	3	4	6	7	9	10	12	13
.125	5-00	30	6990	7004	7019	7033	7047	7061	7076	7090	7104	7118	14	1	3	4	6	7	8	10	11	13
.125	10	31	7132	7146	7160	7174	7188	7202	7215	7229	7243	7256	14	1	3	4	5	7	8	9	11	12
.124	20	32	7270	7284	7297	7311	7324	7337	7351	7364	7377	7390	13	1	3	4	5	7	8	9	11	12
.124	30	33	7404	7417	7430	7443	7456	7469	7482	7495	7508	7520	13	1	3	4	5	7	8	9	10	12
.123	40	34	7533	7546	7559	7571	7584	7597	7609	7622	7634	7647	13	1	3	4	5	6	8	9	10	11
.122	50	35	7659	7672	7684	7696	7709	7721	7733	7745	7757	7769	12	1	2	4	5	6	7	9	10	11
.120	6-00	36	7782	7794	7806	7818	7830	7841	7853	7865	7877	7889	12	1	2	4	5	6	7	8	10	11
.118	10	37	7901	7912	7924	7936	7947	7959	7970	7982	7993	8005	12	1	2	3	5	6	7	8	9	10
.116	20	38	8016	8028	8039	8050	8062	8073	8084	8095	8107	8118	11	1	2	3	4	6	7	8	9	10
.114	30	39	8129	8140	8151	8162	8173	8184	8195	8206	8217	8228	11	1	2	3	4	6	7	8	9	10
.111	40	40	8239	8250	8261	8272	8282	8293	8304	8314	8325	8336	11	1	2	3	4	5	6	8	9	10
.108	50	41	8346	8357	8367	8378	8388	8399	8409	8420	8430	8441	10	1	2	3	4	5	6	7	8	9
.105	7-00	42	8451	8461	8472	8482	8492	8502	8513	8523	8533	8543	10	1	2	3	4	5	6	7	8	9
.102	10	43	8553	8563	8573	8583	8593	8603	8613	8623	8633	8643	10	1	2	3	4	5	6	7	8	9
.098	20	44	8653	8663	8673	8683	8692	8702	8712	8722	8731	8741	10	1	2	3	4	5	6	7	8	9
.094	30	45	8751	8760	8770	8779	8789	8799	8808	8818	8827	8837	10	1	2	3	4	5	6	7	8	8
.089	40	46	8846	8855	8865	8874	8884	8893	8902	8912	8921	8930	9	1	2	3	4	5	6	7	8	8
.085	50	47	8939	8949	8958	8967	8976	8985	8995	9004	9013	9022	9	1	2	3	4	5	6	7	8	8
.079	8-00	48	9031	9040	9049	9058	9067	9076	9085	9094	9103	9112	9	1	2	3	4	5	6	7	8	8
.073	10	49	9120	9129	9138	9147	9156	9165	9173	9182	9191	9199	9	1	2	3	4	5	6	7	8	8
.069	20	50	9208	9217	9226	9234	9243	9251	9260	9269	9277	9286	9	1	2	3	4	5	6	7	8	8
.064	30	51	9294	9303	9311	9320	9328	9337	9345	9353	9362	9370	8	1	2	3	4	5	6	7	8	8
.058	40	52	9379	9387	9395	9404	9412	9420	9428	9437	9445	9453	8	1	2	3	4	5	6	7	8	8
.052	50	53	9461	9469	9477	9486	9494	9502	9510	9518	9526	9534	8	1	2	3	4	5	6	7	8	8
.045	9-00	54	9542	9550	9558	9566	9574	9582	9590	9598	9606	9614	8	1	2	3	4	5	6	7	8	8
.038	10	55	9622	9630	9638	9646	9654	9661	9669	9677	9685	9693	8	1	2	3	4	5	6	7	8	8
.031	20	56	9700	9708	9716	9724	9731	9739	9747	9754	9762	9770	8	1	2	3	4	5	6	7	8	8
.024	30	57	9777	9785	9792	9800	9808	9815	9823	9830	9838	9845	8	1	2	3	4	5	6	7	8	8
.016	40	58	9853	9860	9868	9875	9883	9890	9897	9905	9912	9920	7	1	1	2	3	4	5	6	7	8
.008	50	59	9927	9934	9942	9949	9956	9964	9971	9978	9985	9993	7	1	1	2	3	4	5	6	7	8

Memorandum on Nurma Cotton. By H. PIDDINGTON, Esq.

A very fine silky cotton having been sent to the Secretary of the Asiatic Society, Mr. Torrens, with some other productions from Khorassan, I find on reference to the Transactions of the Agricultural Society, that it is well known in Malwa. Believing it to be of importance that this cotton should have a trial under the American experimentalists, I have ventured to suggest that seed* should be procured in Malwa, and dispatched to Captain Bayles without delay.†

It is also of great importance to obtain specimens of the *soils* in which the Nurma cotton is grown in Malwa; and from the experimental cotton farms, so as to ascertain their identity, or to see what manure may be required. I take the liberty then of subjoining the following queries and directions:—

1. What is the Nurma cotton in Malwa? Is it the common cotton of the country; or a choice sort?

2. Does it grow on any common cotton soil? or are peculiar soils and spots sought out for it?

3. What manure (if any) is used to it?

4. When sown? How sown? When harvested? How cleared?

5. What price does the best sort command? Where is it exported to, if at all?

6. Is it an annual cotton? or does it last more than one year?

7. If it grows on *any* cotton soil, please to select specimens from a couple of the best fields you can find out; if from any peculiar sort of soil, such as red, or white, or black, then form all the sorts.

8. If from a peculiar soil, a specimen of the surrounding common soil of the country would be desirable.

9. Specimens of the soils should be sent as follows:—

a. For sending by dawk-banghy, a large tin wafer-box for each sort is the handiest package; but a larger quantity should be taken to furnish samples to Museums, Societies, &c. This may be sent afterwards.

* Seed of *Nurma* from Herat, procured by me, is now on its way to Captain Bayles.

† I am assuming here that he is not acquainted with it.

b. Scrape off two or three inches of the soil with the hand, and take your specimen also from the field before any manure has been laid on. The soil at two or three inches deep may pretty nearly be called surface-soil; unless, as in rare cases, it changes at this depth. One specimen should be taken here and another at eighteen inches deep.

c. If any rocks or stones are lying about the fields, these should be sent separately. The same of those below at eighteen inches or two feet deep.

d. The soil should be dried on a hot-water plate, or in a hot sun, that it may not rot the labels.

e. A label should be inclosed *within* the box, and it should also be numbered, so as to refer to a list. The box should also be marked *outside* in ink or paint, on the side, and lid.

f. If the manure used be any kind of earth or stone, samples of it should be sent also.

10. Inquiry should be made if at the time of ripening any peculiar manure is added, as with some of the choice sorts of tobacco. If the plants are *topped*, *i. e.* the young shoots pinched off, or beaten with sticks, or allowed to be eaten down by animals. All these processes are used in various parts of the world, (America, the French and Spanish Colonies, Persia, &c.) and no doubt influence both the productiveness and the quality of the cotton to a great extent.

11. Nothing relative to the native methods of culture, irrigation, &c. should be overlooked.

12. Inquire if it is subject to any diseases or insects, which seriously affect the returns from it.

13. The amount of return in clean merchantable cotton per biga; if a known number of square yards, is of importance; and the average price of the best sorts.

Specimens of the soils are requested for the Museum of Economic Geology now forming; and I shall be glad to afford any assistance in the investigation of their qualities which may be desired.

H. PIDDINGTON.

Calcutta, 31st August, 1841.

P.S.—Since writing this, I learn from Mr. Grant, that the Nurma cotton is so highly prized in Malwa, that the rajahs and great persons will wear no garments, but such as are manufactured from it. He

adds, that Mr. Bruce, now in Bundelcund, can give every information relative to it.

The Persian name *Nurmah*, (*Nurm*, "soft,") being applied to a similar article both in Khorassan and in Malwah, would seem to go far to induce the belief, that the Pathan conquerors of the latter country must have introduced this peculiar cotton into the country they subjugated. The fact is worth noting, as it is not often that disproof of so positive a character can be adduced against the common assertion,—that the Mussulman conquerors of India came rather to destroy totally, than to improve by even partial means.

□

Report on some Articles of Trade sent by Lieut. POSTANS from Khorassan. By H. PIDDINGTON, Esq.

I. *Guljuleel*.—This is evidently the yellow flower of a plant. It is however so broken up, that I could with difficulty pick out a few entire flowers for sending to Dr. Wallich, whose severe illness has hitherto prevented my obtaining any reply. He thinks them the flowers of a *Delphinium*.

It is stated to be used for dyeing green, of course with indigo. I find that with the common aluminous mordant, it dyes silk and wool a very handsome canary yellow, as per margin; which with indigo becomes a very good green.* Having but very little of it, I did not experiment further, because I thought it might be better to send it home. The yellow resists coarse soap and water well.

In sending it, or any future sample home for trials, great care should be taken to pack it dry. I found that exposed in paper it absorbs moisture very rapidly, and had a slight mouldy smell, so that I was obliged to dry and keep it in a stoppered bottle.

II. *Bhoj-ghund*.—This is, I think, a new sort of galls. It is widely different in shape and appearance from ours, being a small pyriform brown capsule, much resembling a miniature dried pear; it is hollow and empty, the shell being of a gummy elastic consistence, wholly differing from the Aleppo gall.

* It has no affinity to Cotton.

As our sample is no doubt a bazar, or even a work-shop sample, we may take it to be one at maturity, at least in the best state for use.

I find that it gives a nearly colourless infusion and a tincture, which does not become deeper than of a Lisbon-wine colour. This last is a very valuable property in using it as a chemical re-agent, in which the dark colour of the tincture of common galls sometimes renders it an equivocal test.

I find, by experiment, that its delicacy is fully equal to that of the best Aleppo galls; and the exceeding small portion of extractive matter which it contains, will I think render it of much value in fine dyeing. I have found that it is procurable in the bazars of Calcutta, under the name of *Pistach-ka-fool*,* (Pistachio flowers,) and that it is brought from the Red Sea and Gulf of Persia by the Arab ships, no doubt for the use of fine dyeing operations. This name would lead us to suppose, that it was the gall-nut of the Pistachio tree, (perhaps of the wild Pistachio? *Pistacia terebinthus*?) Its price in our bazar is too high to allow it to be used extensively, but this is probably, as with many other articles of small consumption, owing to the little demand: three rupees per seer was the retail price. Those which I obtained were very old, and were worm-eaten. I am looking out for some new ones, when I can ascertain the quantities of tannin and gallic acid, should we learn upon reference home, that as I suppose, they would be valuable in the arts.

III. *Gum from various trees, principally the Almond.*—This gum seems to hold a middle place between gum arabic and the common cherry-tree gum; and may possibly be of value if well picked, for the market value of gums depends very much on this process. It softens much in damp weather, but dissolves entirely in cold water, having the solution slightly turbid, though quite colourless; which is a great object in the use of gums in dyeing. It should by all means be sent home for trial.

IV. *Nurma Cotton.*—I had occasion, about a year and a half ago, to assert in print, that “the indigenous cottons of India were very little known to us,” and here is an example of the truth of the assertion. This is a very beautiful silky cotton, of which I should think very

* Or Pistach-ka-fol, Pistachio fruit?

highly, and it is sent to us from Khorassan as a novelty. Now I find that (vol. iv. p. 218,) in the Transactions of the Agricultural Society, is a letter under date 12th April 1837, from J. W. Grant, Esq. referring to this very Nurma Cotton, *as having been grown in Malwa from time immemorial!* It is there compared, in two notes, first to the Sea Island, and then to the Upland Georgia. The fact is, that it has the silky fibre of the Sea Island, and the woolly adherence to the seed of the Upland. It more resembles the fine Manilla cotton, which is always worth a shilling a pound, than any other I can compare it to. The Manilla cotton has like it, the woolly seed.

Ours are perfectly fresh, and Dr. Spry has promised me to send them to Captain Bayles. I have two plants growing in my garden, but I suggest that it may be of much importance to procure a quantity of the seed from Malwa, for the Cotton Experiment-farm, with some of the soil it is grown upon, and some of these of the best spots for cotton about the Cotton Experiment stations. By comparative analysis of these, we shall be certain that if it does not succeed, it will be owing to climate, and we shall go to work safely as far as soil is concerned. I add a separate memorandum, that no time be lost in procuring the seed and soil for the approaching season. If samples of the soils are sent to me, I shall be glad to give any assistance I can in the matter.

V. *Musagh, Walnut-tree bark*.—The use of this at home in dyeing, staining of wood, paper, &c. are so well known, that I have not thought it worth while to experiment upon it.

H. PIDDINGTON.

Museum, 24th August, 1841.

*Note on the Cervus Elaphus (?) of the Sál Forest of Nepál. Hodie,
C. Affinis, nob. By B. H. HODGSON, ESQ.*

Many years ago, I announced the existence of the true Stag of Europe in the saul forest of Nepal, upon the strength of a skull and horns in my possession, of which I afterwards published an illustrative sketch in the Journal, giving those of the Sambur or Jarai, and of the Baraiya or *Elaphoides*, for comparison; and observing that the latter species and *Wallichii* seemed to form two distinct links in the chain of connexion between what H. Smith regarded as typical Stags of Europe and of Asia, (*Elaphus* and *Hippelaphus*.) It has lately been asserted, however, that I have confounded the common Stag of Europe, of which there is alleged to be no analogue in India, with *C. Wallichii*;* and, again,† that *C. Wallichii* is really no other than that analogue; there being no grounds for supposing the existence of a third species liker to the Red Deer of Europe than either Wallich's Stag or the Baraiya, which last is pertinaciously called *Du Vaucellii*, despite the explanation afforded long ago in the Journal. I will not enter into discussion with my critics: and I must admit that I have never been able to obtain, or to see, a second specimen of Wallich's, or of the true Stag. Neither do I profess to have lately obtained any new lights as to the leading principle upon which, following H. Smith, I distinguished the several species of *Cervus*, viz. the number and position of the antlers,‡ especially the inferior ones. I too, therefore, may still have my doubts, though they are not precisely those of my critics; for I feel satisfied that there is a Stag in India distinct from the Sambur or *Rusa*, from Wallich's, and from *Du Vaucel's*, and nearer allied to the Red Deer of Europe than any of them; and the accompanying sketch and dimensions will, I think, satisfy most persons that such is the fact:—

* Ogilby, apud Royle.

† Blyth, apud Proc. Zool. Soc., 1840, p. 79.

‡ That is, the basal and median, for the upper are said to be more liable to mutability. The true Stag has three of them (directed forward) on each beam, two of which are basal, and the third a median, or royal. Wallich's has two basal and no median: the Baraiya one basal, and no median, but a crown of many snags at the summit, like our Red Deer, but like no other Indian Deer: the Sambur and Axis have one basal, no median, and one subterminal antler.

Dimensions.

	Inches.
<i>Skull</i> .—Extreme length, along the curve, to upper edge	
of foramen magnum,	22 $\frac{1}{2}$
Do. do. to central jut of transverse crest,	19 $\frac{1}{2}$
The same, by <i>rectilinear</i> measure, like all the measures	
that follow,	17 $\frac{1}{2}$
Symph. maxill. to anteal base of the horn,	14
Symph. maxill. to tips of nasals,	3 $\frac{1}{4}$
Length of the nasals,	6 $\frac{3}{4}$
Greatest breadth of nasals,	2 $\frac{3}{8}$
Length of frontals,	5 $\frac{1}{4}$
Greatest width of do., between outer edges of orbits, ...	7 $\frac{1}{2}$
Greatest width between outer edges of molar teeth, ...	4 $\frac{3}{4}$
Greatest width of occiput,	5 $\frac{7}{8}$
Greatest depth of do. from mesial point of crest to infe-	
rior edge of condyle of foramen,	4
Length of the intermaxillaries,	5 $\frac{1}{8}$
Greatest width between them,	3 $\frac{1}{4}$
Greatest height of skull from frontal crest to inferior, or	
coronal, edge of first molar tooth,	8
<i>Horns</i> .—Greatest length, along the curve,	54
Girth above the burr,	10 $\frac{1}{4}$
Girth between 1st and 2nd basal antlers,	10 $\frac{1}{2}$
Greatest divergency between <i>outer</i> terminal snags, ...	47
Interval between <i>inner</i> terminal snags,	26 $\frac{1}{4}$
Length of the basal antler,	12
Length of the median antler,	8
Length of the superior (outer) antler,	10
Nearest basal interval of the horns,	4

The spoils above measured belonged to an animal of moderate age, being rather young than old, as is proved by the distinctness of the cranial sutures, and of the coronal processes of the teeth; and, by comparison with the skulls of several mature and large specimens of the Sambur or Jarai, I find the skull of the above to exceed them in size in the proportion of about an eighth, whilst the horns surpass the finest specimens of those of the Sambur by two-fifths. The skull is further

distinguished from that of the Sambur, by greater elevation of the frontals, between the bases of the horns, and by a proportionally greater dip across the forehead above and between the orbits; by superior saliency of the orbits, and by their more advanced position in relation to the entire length of the skull; by broader nasals, less arched in their length; by wider intermaxillaries, leaving a larger nasal cavity; and, lastly, by suborbital pits of considerably less size. Of the Baraiya, again, the skull and horns, in proportional size, fall fully as much (and more) short of the present animal, as do those of the Sambur or continental type of Rusa; and if, in reference to such *details* as those just indicated, although there is more resemblance here than before to our subject in the frontal or cerebral portion of the cranium, there is even less in the facial portion, which is singularly compressed and attenuated. The horns of the Baraiya, by their pale hue and smooth surface, as well as by the more forward direction of the basal antler, and the greater reclination of the beam, more nearly approach those of our animal than do the horns of the Sambur. But still they differ by a vast interval in point of size,* as well as in the technical characters of having but one basal snag, no median, and several (four to five) terminal ones. All three skulls are distinguished by canine teeth; but they have no other similar and literal resemblance. Of *Cervus Wallichii*, I have no specimen either of the skull or of the horns; but I have a clear general recollection of the original specimen in the live state; and, with the utmost allowance for the (supposed) effects of decrepitude, I cannot perceive any means of thus soundly accounting for the deficient royal antler, or for the vast inferiority in size, nor, therefore, of identifying *Wallichii* with our present subject.

This animal, as it appears to me, very remarkably resembles the Stag of Europe in almost all the characters of the skull and of the horns, leaving indeed, as distinctive peculiarities, only superior size in the horns,† and the simple Sambur-like bifurcation of their tips. Greater age might possibly have given to our animal the full crown of

* The largest horns of the Baraiya I have measured, were but 34 to 36 inches long by the curve: nor are the largest Sambur horns longer; whereas the horns of our Stag measure no less than 54 in.

† H. Smith, apud Cuvier, gives the dimensions of the horns of a European Stag that were considered enormous; yet they fall short of the size of those of our animal.

snags distinguishing the Red Deer of Europe; and, if so, I should incline to my old opinion, and regard the difference between the two animals as merely a variety. But, on the other hand, the noble horns of our present subject seem so fully developed, and his age so far from juvenile immaturity, that we may reasonably suppose these horns to exhibit the normal form; and, in that case, the species will be distinct from *C. Elaphus*, and may be called *C. Affinis*, from its extreme affinity thereto. The pedicles are tolerably elevate; the burrs rather small; the two basal antlers of each beam of equal size, nearly straight, and so forward in direction as to overshadow the face to the end of the nasals: these basal antlers are larger than the royal, and even than the terminal antler, and are put off from the anterior side of the beam, one above the other, with an interval of about inches two and a half, the beam continuing as thick there as it is close above the burr, where the lower antler divaricates. Having put off these basal snags, the beam reclines considerably, and in the style of *Axis* thirteen inches, and then gives off the median snag from the anteal aspect as before, but with a more upward direction. A foot higher is the terminal fork, the prongs of which radiate laterally and equally from each other, so that it is difficult to say which is the beam and which the antler; more especially as the inner prong (so to speak) of this fork is the longer, though slighter, and the outer one the thicker, though shorter. We now leave our "true Stag of the saul forest," or *Cervus Affinis, nob*, to the discretion of the European Master of Museum and Library. Specific character (?) *C. Affinis*, Stag of India, very closely affined to the Red Deer of Europe. Horns very ample, pale, smooth, rounded, having two basal antlers and one median directed forwards from each beam, but the crown simply forked as in *Rusa* and *Axis*; standing in a natural arrangement between *Elaphus* and *Wallichii*, but larger than either.

B. H. HODGSON.

Nepal, June, 1841.

Notes and Observations, in continuation, from DR. WALKER, Madras Medical Service, on a tour in H. H. the Nizam's Territories.

On the evening of the 25th of April I left Chinnore, and reached Khummamait on the 3d of last month.

Until within thirty miles of Worungul, the sandstone remained the surface rock, but, at this point, the sienite appeared, with its characteristic tors and logging stones, and continued so all the way to Khummum. The various trees mentioned in former reports were seen in abundance, particularly in the sandstone country, the greater portion of which is covered by them, forming, in many parts, a dense forest. The granitic country, on the other hand, although sufficiently well wooded, is, throughout, a much more open country, the tree vegetation being neither so various, nor so luxuriant, as that of the former.

The Circar of Khummamait, differs in scarcely any of its cultivated productions from that of Worungul. The dry grains and legumes of both are identical, and there is scarcely a variety of rice cultivated in the one, that is not grown in the other. Of the garden produce, Turmeric alone, (*Curcuma Longa*,) would appear to be exclusively cultivated at Khummum.

Mineral productions.—Iron ore, of the kind mentioned in the first report, occurs in the neighbourhood of Khummum, even more abundantly than at Hunnumkoondah. In preparing the iron, the great fault observed in the process, is, the little care bestowed in pounding the ore; the workmen, instead of reducing it to a fine powder, as is done in Sweden, content themselves by breaking it into pieces about the size of a hazel nut. Much additional labour, and an unnecessary expenditure of fuel, are the consequences of this error.

The garnet mines of Gopulrowpet, described by Dr. Voysey, are situated to the north-east of Khummum, towards the Godavery, distant about seventy miles. According to his description, which would appear to be found in the alluvium, composed of the debris of a rock of garnetic granite; specimens are sent of the garnets; which are mined and exported in their rough state to Hyderabad on the Coast, where they are cut.

Animal productions.—A considerable quantity of deer and buffalo's horns, the former brought from the jungles, is sent from Khum-

mum ; their usual price there being about a pice each ; the wool produced is manufactured into *cumbuls*, which are also exported. The demand for hides, for agricultural purposes, in the Circar is quite equal to the supply.

The *Mylabris Cichorei*, possessing blistering powers superior to those of the Spanish fly imported from Europe, is abundant throughout the granitic country, from the middle of June till December, and may be gathered for about a rupee a pound.

Vegetable productions.—The *Sansevieria Zeylanica*, the *Ishnia Codanar* of the Telingas, and the *bowstring hemp* of Roxburgh, is a very abundant production, both in the Worungul and the Khummum Circars. Its useful properties are unknown to the natives, who turn it to no account. Dr. Roxburgh proposed the cultivation of this plant for the hemp which it affords, and the strength and tenacity of its fibres, rivalling, which if not excelling, those of its congener and closest ally, the *Phormium Tenax*, (New Zealand flax,) render it remarkable that his proposal should never have been, as far as I am aware, adopted. It is probable, however, that the proneness to nip and rot, when exposed to moisture, is common to the fibres of all monocotyledonous plants ; should such be the case, we must prefer seeking for hemp plants in the exogenous class. In addition to the medicinal plants mentioned in the former report, I may here add the *Cucumis Colocynthis*, the true Colocynth, the *Asclepias Asthmatica*, the country Ipecachuana, the *Ipomoea Cerulea*, the seeds of which have been proposed by Dr. O'Shaughnessy as a substitute for Jalap,—all common plants, and also the *Cæsalpinia Bonduca*, *Gentiana Verticillata*, and some other medicinal plants less known and appreciated,—as several species of *Euphorbia* and *Asclepias*, the *Aschynomene grandiflora*, *Pavetta Indica*, &c.

Manufactures, &c.—Calico printing is practised at Khummum ; but it would appear to be a feeble off-set from the art pursued at Madapollam and Masulipatam, from whence the printers have originally come. The printing is confined to two colours, black and red ; the former obtained from a mixture of gum, myrobolan, and sulphate of iron ; the latter from the root of the *Morinda Citrifolia*. The printing blocks, composed of teak-wood, are procured from Masulipatam, and there is little variety or beauty in the patterns ; the cloths printed are usually coarse surrhees and handkerchiefs. Hand-fans from the leaf of the

Borassus Flabelliformis are manufactured at Khummum, and also a coarse kind of toys. Two of the exports from this Circar are rather remarkable; viz. plates from the leaves of the Pallas tree, (*Butea Frondosa*,) which are sent to the Coast, and kingfisher's feathers, which are purchased by Burmese agents, to be sent to Ava.

Having brought to a conclusion all the information I have been able to collect, regarding the productions of the three Circars of Worungul or Hunnumkoonda, Chinnore or Ramghur, and Khummum, I shall now proceed to give some general observations on the inhabitants, their conditions and diseases, communications, &c. Although, strictly speaking, what follows is applicable to that part of Telingana which is included in a triangle having a point on the Purmeetah river, a few miles north of Sevoucha, for its apex, and a line drawn from Hyderabad to Khummum for its base, yet the greater number of the remarks will be found applicable to a much more extensive range of that country.

The natural division of this country is into the sandstone and granitic. The former is composed of a belt, of various extent, on each side of the Godavery, while the latter is the great formation of the country. Considering how much the causes that modify or determine the character of a people depend on the geological structure of the country they inhabit, I think it as well to state this division *in limine*, as I shall have frequent occasion to refer to it. I regret that I cannot give a very accurate account of the breadth or extent of the former, but, in the plain which I visited to the south of the Godavery, its depth was from twenty to fifty miles from the river, although in many parts it sends out processes covering the granite to a much greater distance.

Inhabitants.—The great majority of inhabitants, perhaps three-fourths of the whole, is composed of Telingana peasantry. This class is readily known by their spare form, dark complexion, and a certain air of subjection impressed by their occupation. They appear a contented race, with less spirit and enterprize than the Mahratta cultivator, but superior to the Bengalee in courage and activity, as is proved by their reputation in the ranks of the Madras army. The indifference to better their condition, and to rise in the world, common to agriculturists in most parts of the world, is fully possessed by the ryots of Telingana.

Brahmins.—If we are to judge of this puzzling caste by common tests, there is much reason, from the striking diversity of feature and

complexion, to pronounce the Telingana Brahmins a mixed race. The *poojarees* wear no turbans, and daub their countenances with paint to a much greater extent than is the custom to the westward. Many Zemindars are Brahmins.

Aylmas.—This is a caste peculiar to Telingana; they affect for themselves a high descent, which however is denied by the other castes, who assert that the *bhaats* (bards) sung them into repute from a very humble origin; they are respected and feared throughout the country, as gallant soldiers, and dangerous enemies. They seclude their women, a practice in all probability derived from the Moosulmans, and which would seem to give countenance to their being but newly sprung up. Several of the Khummumait and Worgungul Zemindars are of this caste; they are a well-made, rather a good-looking, set of men, very fond of the chase and of all active exercises.

Mahomedans.—With the exception of troops, Government employés, and a few tradesmen, there is scarcely a Moosulman in the Telingana country. I, of course, leave the city of Hyderabad out of the question.

Bedurs.—This race, or rather tribe, is found chiefly in the Chinnore Circar, where they take the place of the *Dhurs*, and act as a sort of Gibeonites to the Brahmins and higher castes. Their chief, it is well known, resides at Shorapoor; they are an industrious, contented class, of a darker hue, perhaps, than the Telingana *Coombees*, but with scarcely any other distinguishing mark.

Goands.—It has been customary to consider this people as the aborigines of India: If, by this, it is meant that, as far as records go, they have been what they now are, there is little to be objected to the term, although one that is less decisive ought, in our ignorance, to be applied; but, if it is assumed from any fancied absolute difference in their physical appearance from the inhabitants of the plain or cultivated districts, it is positively to be rejected, as leading to error. It is said that they are a dwarfed, stunted race; but an under-fed, oppressed people, with limited resources, will become so in the course of a few generations. Their not professing Hindooism is surely, with the history of religion before us, no argument that they must be necessarily distinct and separate; nor is their peculiar language (if peculiar it be) a better proof. None of the marked distinctions of form, feature, shape of head, character of hair, by which different races are characterized,

are observed to exist between the Goands and the Telingee cultivators.

The *Goands* are to be found wherever there are hills and fastnesses, but they abound most in the north and east of the Khummum and Ramghur Circars; although a wild uncultivated race that have scarcely advanced a step towards civilization, as is shewn by their non-association in villages. The Telinga *Goands* are not, like the wild tribes towards the north, addicted to cannibalism; good faith and treatment render them tractable and submissive, and would doubtless turn their labour to profit, did circumstances demand it. *Dhurs*, the Telinga *Dhur*, is a despised impure creature. Foreign war and domestic dissension, which, by conferring intelligence, have given some importance to this class in other parts of India, having been wanting in Telingana for centuries, the race has remained in its present state of degradation and moral slavery.

Dwellings.—A Telingana village presents a striking contrast to a Mahratta one; instead of the close flat-roofed habitations of the latter, huddled together, so as to take up the smallest possible space, the greater number of the houses of the former are separate, or, what is called, self-contained. The Gurrie in the Mahratta country which includes, generally speaking, all the houses of the village, is in Telingana a detached fortification of some fifty yards square, composed of masonry and mud, seldom having within its enceinte any houses save that of the zemindar or village chief. In the granitic country, the houses are usually of adhesive earth, of a square or rectangular form, smeared often with red earth, and tricked out with bands of chunam, (the sign of comparative comfort and cleanliness within,) with pyramidal roofs of palmyra leaves or grass. On some occasions the houses are more substantially built, and are tiled; on others, they are mere sheds of palmyra leaves, marking the richer and poorer classes as occupants. The Dherwarra, always detached, and always filthy, is composed of habitations of the latter class.

In the sandstone country, the construction of the houses is different. From the inferior tenacity of the soil it is mostly rejected in building, or, when employed, is mined from the localities where it is ferruginous, and more adhesive. Bamboo and wattle are there the principal substitute for clay in the houses, and the strong-holds are con-

structed of hewn stone ; the labour required in rendering the last tenable, diminishes in no ordinary degree their number, although it may render the few that are constructed more formidable as places of defence.

Food.—The Brahmins of Telingana affect to eat nothing that ever was possessed of life, but report attributes to them any thing but a strict fulfilment of their profession. Their usual diet consists of rice highly seasoned, vegetable curries, cakes flavoured with garlic and asafoetida fried in ghee, wheaten bread, &c. ; with the assistance of the ghee, flour, and condiments, they take good care to avoid the evil consequences said to arise from an unazotized diet. The food of the Zemindars of the *Coombee* caste, resembles that of the Brahmins, with the addition of mutton, fowl, game, &c. The poverty of the cultivators restricts their diet to dry grains ; leguminosæ being within the reach of few, and that only in particular districts. This arises not from the higher price of equal quantities of rice and dry grains, but from the little nourishment yielded by the latter, rendering it a more expensive article of diet. It is only on occasions of festivals or merry-makings that they eat flesh, and (duhee, curdled milk) is also a very common article of diet among the poorer classes. The *Goands* and outcastes, as elsewhere, are wholly without scruples as to their diet, rejecting nothing, whether animal or vegetable, that can be digested by the stomach, and which is not actually poisonous.

Drinking the fermented sap of the palmyra tree, often to intoxication, is the invariable daily custom of the Telingana peasants. Towards Chinnore and Mahdapore, the palmyra tree is not so common, but is then much more detrimental. Matwa spirit, distilled from the flowers of the *Bassia Latifolia*, a common jungle tree, is had very cheap, and in consequence is much used. Brahmins are charged with partaking of both these forbidden beverages in secret, and perhaps with truth, for it would require a more heroic virtue than they are supposed to be possessed of, to keep them from an indulgence so readily procured, and the effects of which, a very ordinary degree of caution can conceal. Tobacco is used by all classes, being smoked and snuffed. Little *bharg*, or any of its preparations, and less opium, are consumed by the Telingas ; but the Goands indulge, as far as their means will permit, in the latter, to which they are much addicted.

DISEASES.

Fever.—Fevers, of the intermittent and remittent types, are met with throughout the whole country, particularly at the close of the monsoons, and for six weeks afterwards; they are not very formidable diseases in the open granitic country, but in the neighbourhood of thick jungles, their severity is much augmented; in the sandstone district there is a good deal of fever in the course of the monsoon, from the great facility with which the soil parts with moisture by evaporation, thereby generating malaria; and here it may be remarked, that the superior drying quality of the sandstone soil over the granitic, is by no means a circumstance favourable to the salubrity of the former. A few days of an October's sun effects its desiccation, and sends up an evaporation loaded with impurity, at a time when the malarian influence is at its height, and when the human frame, weakened by the return of heat, is little adapted to resist its action. The fevers are then of a severe, and often a fatal character, to which the spirit-drinking of the mass of the inhabitants contributes in no small degree.

Spleen.—This disease exists on the banks of the Godavery, after its union with the Purneeta river, and all along the banks of the latter. At Sevoncha it is particularly severe; being attributed by the natives to drinking the impure water of the rivers, for the great depth before water is reached in digging, almost amounts to a preventive to their employing any other.

Cholera.—Compared with other parts of India, cholera cannot be said to be a very prevalent disease in Telingana. For the last eight years it has not appeared epidemically, and, on that occasion, it followed as a consequence of a severe dearth. It is held in great dread by the inhabitants. Leprosy and Elephantiasis, in all their horrid and disgusting shapes, are frequently met with.

Eye complaints.—Diseases affecting the globe of the eye, particularly ulcers of the cornea, albugo, and other consequences of ophthalmia and cataract, are common, especially in the sandstone districts. From what came under my observation, I should say, that affections of the eye appendages are rare.

Dracunculus.—This singular and troublesome disease is met with, in a greater or less degree, all over the country. At Chinnore it is less prevalent than at Worungul, and at Worungul less than at Khummum, which

would appear to be its head-quarters. The natives universally ascribe it to the use of well-water, whether in drinking or bathing; although their explanation of how this happens is not probably correct, from many observations I have made, both here and in the Bombay presidency, I think their opinion is so far well-founded, that when the supply of water is dependent on wells sunk in a decaying rock, whether of granitic or trap, in other words in *Mohrum*, *Dracunculus* is almost certain to exist. There is seldom a body of men who are so similarly situated with respect to diet, exercise, clothing, &c. as European soldiers, yet I have known one-third of a European Regiment, which was indebted solely to wells for its drinking water, laid up with Guinea worm, at the same station with another which used aqueduct water, in which there was not above six or eight cases. The situation, too, of the Telinga cultivators, in the Circars of Khummm and Worungul, is remarkably alike; yet for one case of *Dracunculus* at Worungul, there are four at Khummm, the former deriving their chief supply of water from tanks, while the latter depend solely on their wells, which are sunk in a loose rock. The natives allege, that this disease is acquired by the germ entering the body while bathing at the wells, and that the greater latitude afforded by tanks for washing, diminishes the chances of the worm getting access to the body; but the rare ablution of the European soldiery, who are fully as liable as the natives to this disease, disproves their manner of accounting for the complaint.

The native *hakeems* are, for the most part, Brahmins; their great standby in fever is starvation, and were this means of cure used with moderation, it might be productive of good; but it is pushed sometimes to such an extremity as to cause death from sheer inanition. Opium is given in Cholera, but from the great nicety required in administering the drug in this disease, I should fancy they did as much harm as good with it. They have a proverb for the treatment of Guinea worm, "*Eh naroo huzar dawas*," for one worm there are a hundred remedies; which pretty clearly shews that the much-vaunted native practice in this disease is not so successful as some have represented.

The Surgery is in the hands of the *hujjams*, whose universal cure would seem to be the actual cautery. I have heard of the operation of cataract being performed, but have not had an opportunity of seeing either the operator or his tools. The *hakeems* have their books

of medicine, with the characters written, or rather scratched, on palmyra leaves.

With regard to the most eligible spot for cantoning troops, there are several in the granitic country that would answer the purpose, being salubrious and well situated for supplies, &c. The following circumstances, when grouped together, point out a locality well adapted for this purpose. A red, gritty soil; the neighbourhood of a clear tank; and the country around open and unbroken. The vicinity of a black granitic hill, adding as it does much to the heat of a station, should be avoided: above all, let the troops be independent of wells for a supply of water, for besides its almost constant bitterness, it will bring on Guinea worm, than which no disease can more effectually cripple or render them inefficient. More difficulty would be experienced in fixing a locality for this purpose in the sandstone country. There is no point, after the junction of the Godavery and Purneetah, that can be regarded as salubrious during the latter part of the monsoon, and for weeks after. Madhapore, a village ten miles below the Sungum, where a detachment of the Nizam's troops was at one period cantoned, was found to be very unhealthy at certain times; nor can this excite our surprize, situated as it is between a dense jungle, and the slough and ooze of a muddy river. Chinnore, ten miles above the Sungum, would seem to promise better, the jungle there not being so dense, the river clearer, of much smaller compass, and at a greater distance; while the ground also rises somewhat towards the town.

The Brahmin village of Muntini, still higher up the Godavery, would seem preferable to Chinnore in point of salubrity; but other considerations would, in all probability, fix on the latter as the more eligible position of the two, for troops to be stationed.

Communications.—The road from Masulipatam to Hyderabad skirts the Circar of Khummum to the south. It is a good road, although liable, as every other in the Peninsula is, to be cut up by flood during the monsoon. The red soil is well fitted for road-making, becoming bound and hard when stamped or trod upon. The black soil is, as elsewhere, less so, but its extent in many parts of Telingana is such, that it might in a great measure, be avoided, in the construction of roads. With the exception of the one above-mentioned, there is no other communication of the kind in Telingana, for it would be a misnomer to apply the term to the rude, unmade paths of the

country. In the Chinnore Circar, carts are a very ordinary mode of conveyance, and, as timber is abundant, and iron procured at comparatively a small cost, they are more substantial and better built than in many other parts of India. In the other two Circars, carriage bullocks are almost wholly employed, to the exclusion of carts.

With the exceptions of the Godavery, and the stream sent from the Pakhall Lake to the Kistna, there is no permanent running water in those parts. The latter, although deep, has scarcely width enough to be turned to account as an avenue of commerce; but the Godavery is, with some impediments which would seem removable by art, a navigable river from June till February. I have conversed with more than one individual, who has sailed down the river from Chinnore to Bhudrachellum in three days, from which to the sea, at Coringa, no great obstacle offers itself. Captain Fenwick, late of the Nizam's service, from whom I have derived the greater part of the information respecting the Godavery that I have now the honour of communicating, and who had ample opportunities of making correct and extensive observations, having frequently sailed down the stream, says, "From Coringa to Bhudrachellum the navigation is perfectly free, except that there is a whirlpool, or *papee condul*, not far above Palaverum, at the opening of the narrow and tortuous straits of the same name, which wind through a range of high hills for more than twelve or fifteen miles, commencing from the Nizam's boundary. The river here is generally not more than 300 yards wide. In some places, I think even less. The mountains rise almost perpendicularly from the water's edge, and the depth is many fathoms."

From Bhudrachellum to Ellapoka, the river is impeded by rocks when it is low; but when half full or more, there is difficulty in the navigation. The same description applies to the rocks marked at Chentral, Doonurgoovum, and Albaka; from the last point the river, although quite free, is somewhat shallow, early after the rains. The next obstacle is the two whirlpools at Mooknoor, which, when the river is full, present a considerable obstacle, but not so when it is moderately full, at which time the boatmen, who are very expert, manage to steer between them without danger. The passage between Nulumpully and Mooknoor is only tedious after the rains, as during the freshes the rocks may be sailed over. The last obstacle in the Godavery is just at the

junction of the Indaroottee. The channel through the rocks, which are there high, is very narrow, and pointed ones in it render the passage somewhat dangerous. "Some of these," adds Captain Fenwick, "I had removed; the nature of the rock being soft slate."

From the junction of the Indarooke to the Purneetah, not a pebble is met with, and the Purneetah itself, which contains at least double the water of the Godavery at Chinnore, is without impediment of any kind up to Coorta. The rocks there and at Dharoor are only formidable when the river is low; above these, there is no obstacle as far as Chunchmundel above Woone, where the rocks are formidable, if not insurmountable obstructions.

The map of the Godavery and Purneetah accompanying this letter, is copied partly from maps procured from the Residency, and partly from plans sent by Captain Fenwick, drawn up from his own experience.

The boats of the Godavery are miserable canoes, hollowed out of the trunk of a single teak-tree. Two are often joined together by means of a raft of bamboos, particularly for the purpose of ferrying; they are without sails or fixed rudders.

I cannot conclude these letters without bearing testimony to the comfort and happiness which the natives of these districts appear to enjoy. The short period I spent in the country could not afford me many opportunities of inquiring minutely into the circumstances, or of making very extensive observations; but there are signs of general prosperity, particularly in the Circars of Worungul and Khummum, that he who runs may read; of these I may mention the frequent occurrence of silver ornaments among the wives and children of the *Coombees*, and the rare circumstance of a ruined tank; nor can I omit to mention the kindness of Mr. Wighton, who afforded me every facility and assistance in his power, in fulfilling the purpose for which I had been sent to the districts.

A general Review of the Species of true Stag, or Elaphoid. form of Cervus, comprising those more immediately related to the Red Deer of Europe. By EDWARD BLYTH, Curator of the Museum of the Bengal Asiatic Society.

Of the various minor groups distinguishable in the great genus of the Deer (*Cervus*, Lin.), a very obvious one is exemplified by the European Stag (*C. Elaphus*, Lin.), or Red Deer of Britain, to which the Greek word *Ελαφο* has hitherto been specifically attached; and it is accordingly known as the *Elaphine* group of Colonel Hamilton Smith, or that of the Stags, properly so called. It consists of several large, powerful, and comparatively long-bodied species, with cylindrical antlers,* bearing many tines or branches, and a short tail surrounded by a pale disk. The males of them, and occasionally, I believe, the females also, are furnished with upper canine teeth. Their coat is more or less harsh, tubular, and spongy, and conceals in winter much delicately fine wool; being in the young speckled, or *menilled*, with white, as in most, but not all, other *Cervi*; which spotting disappears with the first shedding of the hair, except, in some, a row along each side of the spine, which however are considerably obscured, though there is again a tendency in some species to resume the spots in summer livery, which is always more or less rufous (as in most other Deer), that of winter being generally darker, especially on the neck, limbs, and under-parts, and the female being mostly paler than the male. The most peculiar character, however, of this group, though it nevertheless does not occur in all the species which strictly pertain to it, consists in the normal presence of a second basal tine to the antlers (*vide* plate,—fig. 3, *b*), which occurs normally in no other species of the family: these two basal tines are denominated, in books on “venerie,” the “brow antler” (*a*), and the “bez-antler” (*b*); for the word “antler” referred to the principal tines, or branches, and not to the entire

* In conformity with the practice of some recent naturalists, I apply this term to the *deciduous* horns of the Deer family, as distinguished from those of other horned ruminants, which are borne permanently, and have their bony core invested by a cuticular or corneous sheath, likewise persistent, after having been (at least the softer external layer) once shed in the young animal, and which partly corresponds to the *velvet*, or hairy skin, of a growing Stag's antler, that withers and shreds off when the vessels it encloses are obstructed by the final deposition of bone, forming the *burr*, or basal ring.

production, which may be more conveniently distinguished by that appellation. A third tine (*c*) is given off midway up the beam, which was termed the "royal" antler; and the ramifying summit of the beam (*d*), was styled the "crown," or "surroyal." I shall simply designate them as the *first and second basal tines* (*a, b*), the *medial* (*c*), and the *crown*; and may remark, that in the European and some other species, the last assumes a more characteristic form than in the generality of Wapiti Stag's antlers, (the species represented,) being generally trifid (as in fig. 3, *d*.) with a disposition to subdivide further, more particularly shewn by the innermost and hindward of the three coronal prongs that issue from a common centre, and which is always longest, imparting a lyrate curvature to the entire pair of antlers when viewed in front.

These noble and picturesque animals are gregarious, and frequent extensive moorlands, interspersed with bog and forest, more particularly on the lower ranges of mountains, where indeed such tracts usually occur. In general, or with some modifications, the habits of the British Red Deer may be presumed to illustrate those of all the other species; the gigantic Wapiti, perhaps, differing most in its monogamous inclination, which, it may be, the nearly allied Jerrael Stag (*C. Wallichii*); of middle Asia, likewise evinces. The geographical range of the group extends to both continents, but is confined to the northern hemisphere; and, with the sole reported exception of the Jerrael, upon the mountainous interior of the Burmese territory, to the northern temperate zone; with one established exception, however, they belong to the eastern continent.

The American species, denominated the Wapiti (*C. Canadensis*, Gmelin, *C. Strongyloceros*, Schreber), or "Elk" of the Anglo-Americans, by whom the true Elk (or *Alces* of Cæsar) is termed *Moose*,* is

* The frequent mal-appropriation of vernacular names, such as is here noticed, and which is a great deal too much encouraged by writers on Zoology, leads to continual misunderstanding and mistakes, of which an instance is now before me, in the description of the true Elk, published in the Naturalist's Library, where an anecdote related by Major Long and Mr. Say, referring to the Wapiti under its false name of Elk, is assigned to the species properly so called. In South America, the same appellation, Elk, is bestowed on the *Cervus Paludosus*; in India, on the Sambur, *C. Hippelaphus*; in the Malayan territories, on the *C. Equinus*; and finally, in South Africa, the Caffrarian Impoof (a sheath-horned ruminant) is designated *Elk*, *Eland*, or *Eland-bok*. "*Eland*" is the Swedish term for the true Elk, and signifies *miserable*; in allusion, no doubt, to the extremely plaintive and dolorous cry emitted by this animal, rather than to its being subject, as alleged, to frequent fits of epilepsy, which has been suggested to have induced the application of such a name.

a great imposing animal, the largest (so far as known) of the whole group; and it would appear to exemplify a subordinate section of the Stags, characterized generally by large stature, a heavier and less compact build, shorter tail, and enlarged white disk surrounding it; the head borne low and horizontally, with the neck much bowed, as in a Camel; and the crown of the antlers assuming generally a different form from that of the others, very seldom trifurcating (so far at least as my experience has gone), but the continuation of the beam usually turning abruptly backward and downward, and throwing up a series of successively diminishing tines, all nearly in a line with each other (vide Plate, fig. 4). Of a very considerable number of full grown Wapiti antlers, I have seen but one pair whereof the crown decidedly trifurcated (as in fig. 3); and have remarked that many had the second basal tine longer than the first, which however is abnormal, and also that the greater number had a snag (fig. 3, *c*,) near the origin of the two basal tines, which is of rare occurrence in the European and what other species I have had opportunities of examining.

The Wapiti stands four feet and three quarters to five feet and upwards high at the shoulders, with towering antlers, sometimes above five feet in length, though they rarely much exceed four feet; they are often a foot round at base above the burr, and eight inches in the beam; the pair diverging more or less, but sweeping round till they converge towards the extremities, as in the genus generally. An unusually large male, killed by the hunters attached to the expedition of Messrs. Lewis and Clark, was found "on placing it in its natural erect position, to measure five feet and a quarter from point of hoof to shoulder;" but the curve of the body is probably here included, which would add some inches to the alleged height of so large a creature. It is certain that they do not generally attain to so much as five feet high, and the female to more than four feet and a half. The head of the male measures fifteen inches from muzzle to base of antler; the ears nine inches; tail four inches, or, with hair, five; and from nose to base of tail, in a specimen four feet and three quarters high, eight feet ten inches. This large species (of which magnificent specimens are now living in England, in the Zoological Gardens and elsewhere,) has an aspect of much grandeur and stateliness, but is deficient in the grace of its European relative; being considerably more massive and

ponderous, with stouter limbs, shorter in proportion, and terminated by broader and more ox-like hoofs; at least the inner hoof of their cleft fore-feet (more especially) is much widened. The full grown male, in winter more particularly, has a peculiar character in a sort of beard pendent from the throat, in aspect not unlike a dewlap; besides which, as in the European species, the hair is in winter lengthened around the neck, only not so coarse as in that animal. The summer hue of both sexes is very bright rufous, darker on the head and neck; and the male is seldom without some appearance of the throat beard, though his neck becomes quite smooth; in the course of a few weeks only, the tips of the hairs begin to fall off, and the colouring is thus rendered nearly similar to that of winter, save that the hues are much less finely brought out; at which latter season the Wapiti is clad with longer hair, of a pale lilac-chocolate colour, approaching to whitish in fine males, with the limbs, lower part of the neck, and under-parts, dark and deep russet brown; colours which are not so intensely contrasted in the females and younger males. The fawn is but slightly menilled on the sides, and it is remarkable that there is no trace of the usual row of large spots on each side of the dorsal line, which alone are permanent in the European Stag. Whether the same is observable in the young of other species of this group, I have not now the means of ascertaining. The general colour of the Wapiti fawn is deep rufous brown, fainter on the sides, and still more so on the under-parts, (whereas the adults are there darker); the face, the neck partly, and immediately above the hoofs, being much darker; a black line passes along the back, and there is a streak of the same, as usual, over each eye. The characteristic expression of its species is strongly marked from the first. They do not acquire their full growth under four or five years at least, (like the European Stag); but, as in the rest of the genus, can propagate at eighteen months old. Mr. Bullock states, that one five years of age stood four feet and a half high, and was nine feet in total length. These younger Wapiti have more the aspect of the European species, and, like the female, shew little trace of the throat-beard, nor have they much lengthened hair round the neck. The fully adult female more resembles the European hind, than is the case with the mature males of these species, with all their distinctive characters fully developed. At the same time, I have observed that some European Stags have

decidedly more the contour of the Wapiti than others, being lower upon, and not so fine in the limbs; as is well exemplified by two Common Stags that were living in the Zoological Gardens, Regent's Park, at the time I left London, near the end of April, 1841.

The full grown Wapiti, like other true Stags, sheds its antlers either late in February, or (the majority) during March: in less than a month, the new have attained a foot in length, and continue to grow with surprising rapidity, at one time, above an inch and a half per day; but the growth slackens as they advance towards completion and solidify, being not finished before August; the velvet sheds off in September, when the rutting epoch commences, and lasts through the following month; the period of gestation is rather more than eight months, (as I was informed at the Zoological Society's Garden, and not so much as nine months, as has been asserted); being about the same, accordingly, as that of the European hind; and the young, either one or (in the wild state) commonly two in number, and in case of twins (which would appear to happen much oftener than in the British Red Deer) generally male and female, being accordingly dropped—a few at the end of May, but the majority in June. Colonel Smith noticed, that the medial and basal tines of the antlers of this species “seem to be instruments of use; for, with them, when a small dead pine, or a bar of a split fence, sixteen or eighteen feet long, lies in their way, they will lift and toss it clear over their heads.” Possessing these appendages, they make such incidental use of them; but we are not to suppose that their antlers were designed for purposes of this kind.

The wild Wapiti, notwithstanding its great size, is as timorous as any other Deer; except, as usual, during the rutting excitement, when it is dangerous to approach the males. It inhabits the greater part of North America, but “does not extend its range,” according to Dr. Richardson, “further to the north than the 56th or 57th degree of latitude, nor (in the fur countries) is it found to the eastward of a line drawn from the south end of Lake Winnipeg to the Saskatchewan, in the 103d degree of longitude, and from thence till it reaches the Elk River, in the 111th degree. To the south of Lake Winnipeg, it may perhaps extend further to the eastward.” Messrs. Lewis and Clark, in their arduous expedition to the source of the Missouri, and thence to the shore, of the Pacific, encountered the Wapiti in considerable

abundance nearly throughout their route, and pretty high up the mountains; and they state it to be "common in every part of the country, as well in the timbered lands as in the plains, though much more numerous in the former." Hunter, in the interesting "Memoirs" of his youth, passed among different (so called) Indian tribes, asserts that "they are small, far south, but increase in size in the neighbourhood of the mountains." He also mentions, that they are very large about the Columbia. In the States, the distribution eastward of this species is limited by the settlements, in the vicinity of which it fast disappears as they become populous; having been extirpated more than a dozen years in Illinois,* while Dr. Godman (in 1826) writes, that "it is still occasionally found in the remote and thinly settled parts of Pennsylvania, but the number is small; and it is only in the western wilds that they occur in considerable herds."†

Dr. Richardson describes this species to be "pretty numerous amongst the clumps of wood that skirt the plains of the Saskatchewan, where they live in small families of six or seven individuals:" the males, according to Dr. Harlan, attaching themselves to the females, and the members of each troop being strongly united. Colonel Smith also mentions, that "they are said to live in small families of six or seven individuals, headed by an old male, who is reported to be monogamous; the rest, besides the hind, being calves or semi-adults." I have met with no account of the sexes ever herding separately: but Hearne asserts, that "they generally keep in large herds, and, when they find plenty of pasture, remain a long time in one place;" so, also, Umfreville relates, of his "Red Deer," which is clearly this species, though *C. Virginianus* is often so termed in the States, "They are very common in all parts of the country, and they assemble in herds; it is not unusual to find 500 or 600 of them in a place; but they are not to be met with on the open plains, where the Buffaloes [American Bisons‡] resort." The same is noticed in Keating's "Narrative of an

* Featherstonehough's Journal.

† American Natural History.

‡ The term *Buffalo* is often vaguely applied by persons not naturalists, to any animal bearing a general resemblance to an Ox, but which is obviously distinct from an Ox. Thus, when English graziers talk of having seen a Buffalo, it will generally be found that the large or Brahmince breed of Zebus, or Indian humped cattle, is intended; and in North America the Bison of that continent is thus termed (as above

Expedition to the source of St. Peter's River;" but Lewis and Clark occasionally observed them upon the same plains with the Bisons, as in page 82 of their work, where it is stated, that "fifty-two herds of Buffalo, and three of Elk [Wapiti] were counted at a single view!" I have been informed, however, by a gentleman who has travelled much in the western regions of North America, that they never associate with the Bisons, and it is very rarely that both species may be seen at one view: though Catesby asserts, that "they usually accompany Buffaloes, with which they [did, in his time,] range in the upper and remote parts of Carolina, where," he remarks, "as well as in the other colonies, they are improperly called Elk." Keating mentions "a herd of fifty or sixty Elk," which some of his people "approached on horse-back, as near as they could, without alarming them, when the party dismounted, and crept for about a quarter of a mile on their hands and knees, leading their horses until they came within eighty yards, when they all fired, and one of the herd fell. A member of the party then mounted his horse, and pursued the herd for more than a mile, but his horse was too much alarmed by their appearance to be urged on near enough to allow pistol-shot to take effect. While in pursuit of them, he observed the Elk in the rear would frequently stop to look at him [standing at gaze, as it is termed, like all other ruminants]. When in herds they are easily overtaken, but when they are alone it is much more difficult. This animal is represented, however, as short-winded."* It is probable

noticed), which, inhabiting the same region with the so-called Indians, is sometimes even worse styled—the Indian Buffalo. In India, the word *Bison* is, in like manner, attached to a species which is not a Bison, namely, the Gaour, (*Bos Gaurus*); and Capt. Lyon mentions three distinct species of animals inhabiting the mountains to the south of Fezzan, all of which he erroneously calls Buffaloes, though two at least of them are not even Bovine. Those who write on subjects of Natural History should be more definite in their choice of vernacular appellations than has hitherto been customary, at least in the English language, and in time such errors may be eradicated; though not before the city of *Buffalo*, in North America, and the *Elk River* (so named from the number of Wapiti Stags, not Elks, that are found on its banks), have perpetuated the memory of them in these established denominations. The name Buffalo derives from the term *Bubalus* of the ancients, which was applied to the true Indian species; otherwise, it has been remarked, on the subject of purely fortuitous coincidences of the kind, a legitimate derivation would have seemed to occur in *Beuf à l'eau*!

* Keating's "Narrative" vol. ii. p. 1. "A large herd of Elk" is also mentioned in vol. i., p. 303; and I could cite other instances of Horses being much frightened at the sight of these creatures.

that the herds of Wapiti are made up by the aggregation of a number of distinct families, such as have been already noticed, the individuals of which know each other, and keep together; for this is the case in many gregarious animals, and I have observed that, in the common Fallow Deer of English Parks, the sexes of which herd separately during the summer, particular individuals of the same age occasionally evince a friendship for each other, and always feed together, which partiality is resumed, by the same individuals, season after season. In like manner, herds of domestic Oxen commonly separate, or rather resolve into pairs; and the advantage of always stalling such pairs together is duly appreciated by English graziers, who find that their cattle are apt to pine, and not to fatten well when separated from the companion of their choice, in whose presence they appear to derive some consolation for the irksomeness of imprisonment.

The Wapiti Stag feeds much, like the European species, upon grass, and in like manner eats the young shoots of willow and poplar, as also "some buds of coniferous trees," according to Colonel Smith, who, from personal observation, adds that "in summer they feed on aquatic plants, which they seek under water, while sheltering themselves in that element from the bites of flies." It is worthy of notice, that the Rein Deer Gadfly, according to Captain Franklin, "infests the Wapiti, but not the Moose or Bison; nor have its larvæ ever been found upon the Wild Sheep or Goat of the Rocky Mountains, although the Rein Deer of those parts are as much tormented by them as those of the coast."* Kalm states, that this species feeds eagerly on the broad-leaved kalmia, "which is poisonous to other horned animals;" and Dr. Richardson describes them to be "very fond of the hips of the *Rosa blanda*, which forms much of the underwood in the districts which they frequent. Hearne," he continues, "remarks that they are the most stupid of the Deer kind, and frequently make a shrill whistling and quivering noise, not very unlike the braying of an Ass. Mr. Drummond, who saw many of these Deer in his journeys through the plains of the Saskatchewan, informs me, that it does not *bell*, like the Stag of Europe; and Mons. F. Cuvier describes the cry of the male as being prolonged and acute, and consisting of the successive sounds of *a, o, u*, (French,) uttered

* "Narrative of Second Expedition," p. 189.

with so much strength as to offend the ear. The cry of the European Stag, when compared to it, is dull and tame, though not deficient in strength." On one occasion I have remarked a cry, which, though not loud, corresponded otherwise with F. Cuvier's description, from an isolated female, which seemed to express *ennui*, or impatience of solitude: the only sound I have ever heard the male emit, is a disagreeable snuffling noise, expressive of menace, which it often makes during the rutting season. Dr. Richardson further adds, after Hearne, that "the flesh of the Wapiti is coarse, and but little prized by the natives, principally on account of its fat being hard like suet, [as, indeed, in all other *Cervidæ*, except the Elk.] It seemed to me to want the juiciness of venison, and to resemble dry, but small-grained beef. The hide, when made into leather, is said not to turn hard after being wet, and, in this respect, to excel Moose or Rein Deer leather."*

Dr. Godman remarks, that "the Wapiti is shy and retiring. The moment the air is tainted with the odour of his enemy, his head is raised with energy, his ears rapidly turn in every direction to catch the sound, and his large glistening eye expresses the most eager attention. Soon as the approaching hunter is fairly descried, the Elk bounds along for a few paces, as if trying his strength for flight, stops, turns half round, and scans his pursuer with a steady gaze; then, throwing back his lofty antlers, he springs from the ground and advances with a velocity that soon leaves the object of his dread far out of sight. In the rutting season, however, this animal assumes a more warlike and threatening aspect. He is neither so easily put to flight, nor can he be approached with impunity, although he may have been wounded. His hoofs and horns are then employed with full effect, and the lives of men and dogs are endangered by coming within his reach." An instance of this is recorded by Major Long and Mr. Say, wherein a wounded animal "turned furiously upon the foremost of his pursuers, who only saved himself by springing into a thicket, which was impassable to the Elk, whose enormous antlers becoming so entangled in the vines as to be covered to the tips, he was thus held fast and blindfolded, and was despatched without difficulty." It can only be wondered that such cases are not of much more frequent occurrence.

* *Fauna Americana-borealis*, and Hearne's Narrative.

The most nearly allied species to the Wapiti, I conceive to be the Jerräel Stag, (*C. Wallichii*, Duvaucel), a splendid Asiatic animal, hitherto only known in Europe from the coloured drawing transmitted by M. Duvaucel, and published by Mons. F. Cuvier. The following particulars are principally taken from a MS. description by the late Major-General Hardwicke, which, together with a bad coloured figure of the individual, I found among his papers deposited in the library of the British Museum. It doubtless refers to the identical specimen which was seen by Mr. Hodgson, and figured by M. Duvaucel, and the antlers of which are now before me in the Museum of the Asiatic Society: these, which are evidently the same as are figured in both drawings, I am enabled to state positively belonged to an animal in its third year, at which age it would by no means have attained its full growth; and the suggestion of my esteemed friend, Colonel Hamilton Smith, therefore, that it is doubtful whether the specimen was not aged, with declining antlers, I venture to negative without any hesitation.

This animal, according to General Hardwicke, stood four feet and a quarter high at the shoulder, and from muzzle to base of tail measured seven feet and a quarter; the tail five inches, surrounded by a disk nine inches square; head to vertex one foot five inches, and thence to shoulder two feet five inches; the ear, including its base, eleven inches. Hair on the ridge of the neck long, thick, and bushy, standing like a mane, and browner than the rest.* The prevalent colour a brownish ash, darkest along the dorsal line to the rump-patch, which is pure white, contrasting strongly with a blackish border, that merges without into the hue of the rest of the body. The limbs and under-parts are remarkable (more particularly as shewn by M. Duvaucel's figure) for being pale, whereas in other Stags these are darker than the body. Lips and chin white; the ears large and ovate, with a deep-sheathed base, and covered with whitish hairs; and the eyes large and surrounded by a whitish circle. The texture of the coat appears, from description, to resemble that of the Wapiti; and General Hardwicke states, that the animal "bowed down its neck in the manner of a Camel," *i. e.* the Wapiti, "and, when moving, carried its head very high, bringing the

* The whiteness of the antlers, as represented by M. Duvaucel, intimates that they were then about to be shed, and consequently the season at which the animal was figured, which was probably in the month of February or March.

front almost to a horizontal position. It was brought from Mukte-nauth, about five weeks journey from the valley of Nepâl, in a north-westerly direction;" and the name *Cervus Wallichii*, I may remark, occurs in the interesting list of Mammalia inhabiting the Tenasserim provinces, prepared by the late unfortunate Dr. Helfer;* though this alleged identification of the species much requires to be confirmed.

The pair of antlers in the Society's collection are rather more than two feet long, following the curvature of the beam, five inches and a half round above the burr, and five inches immediately above the two basal tines; each possesses these, and one of them has no further subdivision, while the other throws off what I cannot hesitate in considering to be a median tine, or "royal," the bifurcation being 11 inches above the second basal tine, or "bez." Mr. Hodgson, therefore, I feel satisfied, is incorrect in supposing that the Jerrâel has no median tine.† In the Gardens of the Zoological Society, there now exist (or did so, when I left England,) a fine pair, male and female, of the noble Persian Stag, or *Maral*, brought from that country, and presented to the Society, by Sir John McNeill. At the time of their arrival, the male bore his second pair of antlers, (what, however, are usually regarded as the first, though the true Stags, unlike the Fallow Deer, Axis, &c., develop a small knob, or "button," as technically styled, the first year); this second pair consisted, as usual, of slender branchless beams, termed "brockets," but the following year (1840) were replaced by a pair corresponding to those of the Jerrâel now before me, except that the median tine existed in both antlers. In the common European Stag, the second basal tine is ordinarily wanting at this age, but irregularities of the kind occur in every species: it is remarkable that the two basal tines of the young *Maral*, or Persian Stag, in the Zoological Gardens, were conjoined for a short space at base, but it remains to be ascertained whether this be a permanent character. In the Jerrâel's antlers before me, there is an interval of an inch and a half in one of them, separating the two basal tines, the same as is generally noticeable in the European Stag; while, in the Wapiti, this scarcely ever exists. For a figure of the pair, *vide* Plate, fig 7; and of those of the Persian species, sketched from

* *Vide Journal of the Asiatic Society of Bengal*, for 1838, p. 897, et seq.

† *Vide* Note to p. 721, *ante*.

memory only, though I venture to affirm not very inaccurately, vide fig. 10.

I now pass to a consideration of Mr. Hodgson's *C. Affinis*, represented in pl. —; and with all deference to that gentleman, I feel constrained to observe, that I can perceive no reason whatever why his animal should not be identified with *C. Wallichii*, as originally suggested by Mr. Ogilby, and accepted by myself on a former occasion. It appears to me, that Mr. Hodgson's specimen represents the animal in its fourth, or probably fifth, year; at apparently the former of which ages, there is a stuffed specimen of *C. Elaphus* in the Museum of the Zoological Society, with absolutely (so far as I can remember) the same flexure, or somewhat abrupt bend upwards about the middle of the beam, represented in Mr. Hodgson's sketch: the youth, or "moderate age," of this naturalist's specimen is attested, as he justly observes, by the condition of the teeth and cranial sutures; and I cannot doubt that, with full maturity, this noble species possesses a terminal crown to its antlers, assuming, thus, every feature of a typical member of the Elaphine group.

The Jerräel, probably, extends its range widely over the Chinese empire; and it may be presumed to be the "great Stag" mentioned by geographers upon the ranges of the Altai. Such is indicated in Strahlenberg's work on the northern and eastern parts of Europe and Asia, (p. 371, English translation,) as the *Irbisch*, or great Stag of Siberia, which inhabits that vast region, in addition to the *Isubrissen*, or common Stag; the *Suchata*, or Elk; *Olen*, or Rein Deer; *Cosa*, or Roe, &c. Whether it be identical with the Kashmir Stag of my friend Mr. Vigne, which I think is very likely, that gentleman having observed it in summer garb, remains to be determined. I understand that Dr. Falconer considers them distinct; and, at the request of Mr. Vigne, who furnished Dr. Falconer with some particulars with which he has likewise favored me, I leave this Kashmir species to be described by the latter eminent naturalist. I may, however, venture to publish two drawings of an antler of the Kashmir Stag (Plate, — figs. 8, 9,) in the collection of Mr. Vigne, the dimensions of which are already published in the Proceedings of the Zoological Society for 1840, p. 72, on the occasion of my exhibiting the specimen. This antler measured forty-four inches in length, and was eight inches round above the burr; the

general character being intermediate to that of the Wapiti and of the European Stag, but agreeing more nearly with the latter in its kind of granulated surface. Respecting the great Siberian species, we are informed by Pennant, (in his Arctic Zoology, p. 31,) probably on the authority of a private communication from his correspondent, Professor Pallas, that, "Stags are totally extirpated in Russia, but abound in the mountainous southern tract of Siberia, where they grow to a size far superior to what is known in Europe. The height of a grown hind is four feet nine inches and a half, its length eight feet, and that of its head one foot eight inches and a half," which is proportionate to Mr. Hodgson's admeasurements of the skull of the male,* and scarcely, if at all, inferior to the American Wapiti. I cannot bring myself to think that an Elk (*Alces Casaris*) is here alluded to; but may mention that a fully grown female Elk, which I measured alive in the Zoological Gardens, gave eight feet and a quarter from muzzle to base of tail, and stood five feet two inches high at the back; the apparent elevation of its withers consisting of hair only. Its head, measuring over the drooping upper lip to the rudimental naked muzzle, gave twenty-six inches and a half.

The ordinary fossil Stag of Europe, currently identified with *C. Elaphus*, is generally about one-fourth larger in all the dimensions of its antlers than the common existing species of the same region, as remarked to me, of the fossil specimens found in Switzerland, by my friend Professor Schinz, of Zurich; and this I have equally found to be the case in numerous examples obtained from the gravel and peat of various districts in the British Islands. It would even appear that a remnant of this larger race still survives in Hungary, or was in existence not many years ago. Of such an animal, it is stated, in a German sporting work, 'Wildungen's Wiedmann's Feierabende, (p. 91,) that the author "has to thank Count Erbach-Erbach for the antlers herewith carefully figured, (and one of which is copied in the Plate, fig. 11), which prove that the Giant Stag is not yet totally extirpated in Europe. The animal which bore them was shot by a Wallachian, in the year 1815, on the Imperial Lordship Rewantz, on the Buckowina, and the Count received the antlers from a friend who superintends the imperial

* Vide p. 722, ante.

studs in that province, and who assured him, that the specimen by no means represented one of the largest of the Stags still found in that country, and hoped that he would be able to send one still more considerable. The circumference of the burr was eleven inches and a quarter, (Rheinland measure,) and of the beam, above the basal tines, nine inches and a quarter. Extreme expanse, measured outside, five feet, and the innermost tips were three feet and half asunder. Length of the right horn, following the curvature, four feet from burr to summit."† The character of these antlers is absolutely that of the British Red Deer, but the size equals the Wapiti; and it is strange that so grand a species, for such it must be, should still remain to be investigated and described. I am inclined to suspect that to this "Giant Stag" must be referred an extraordinarily fine pair of "German Stag horns," that have been hung up, as I understand for more than thirty years, in front of a cutler's shop, in Great Turnstile, London. These measure forty-one inches over the curvature, and ten inches and a quarter round at base, above the burr; the crown of one, in particular, is very fine; and of numerous other Stag antlers, imported from Germany, to be manufactured into knife handles, &c., not any approached to these dimensions. The antlers of the common European Stag, or British Red Deer, seldom exceed three feet in length, and are generally under; and the animal scarcely stands above three feet and a half high at the back; but its general form is more elegant than that of any other species of the group with which I am acquainted.

(To be continued.)

Explanation of the Plate.

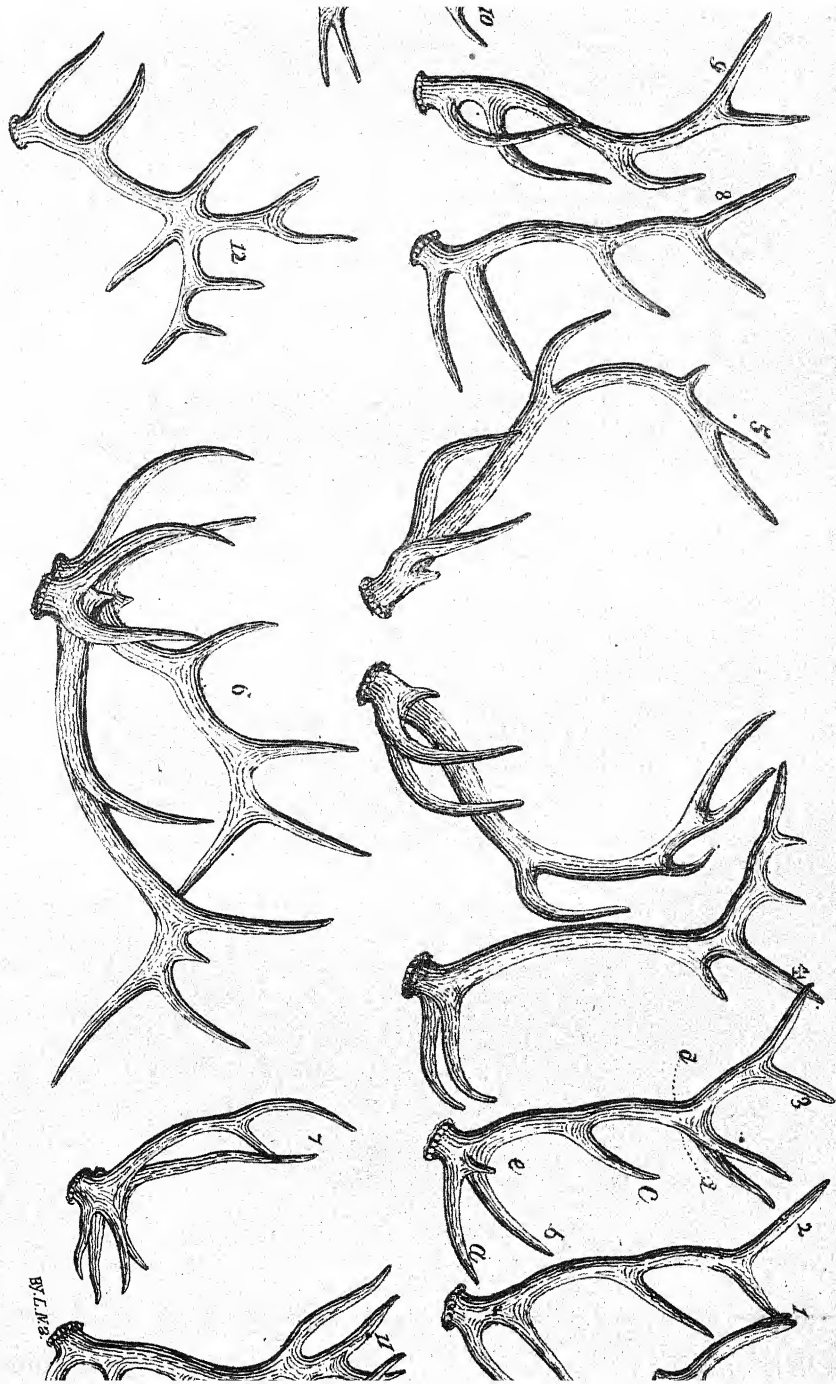
Figure 3 represents a Wapiti Stag's antler, *a* and *b* indicating the two basal tines or branches, or the "brow and bez antlers" of writers on *venerie*; *c*, the median tine, or "royal antler;" and the portion above *d*, *d*, the "crown, or sur-royal;" *e*, is a mere snag, of very common occurrence in this particular species, and not very unfrequently met with in the Axine group of Deer, where it is always thus directed

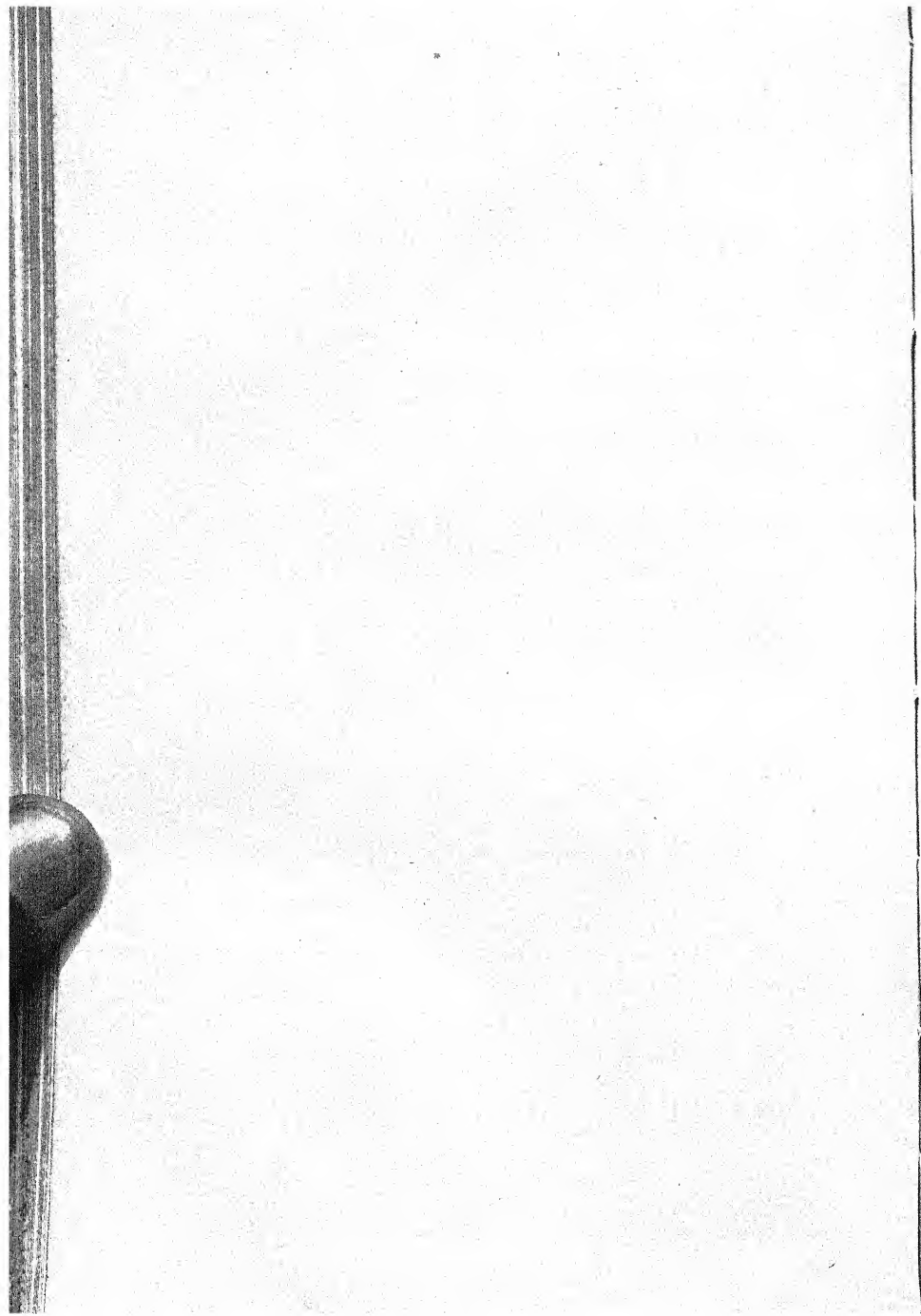
† For these particulars I am indebted to the kindness of Colonel Hamilton Smith, to whom a copy of the work was presented by the author, who was one of the chief observers of the game and forests of the Elector of Hesse.

upwards, and not outwards and forwards (like a veritable second basal tine, or "bez"). Neither the second basal nor the median tine ever occurs in the Axine or Rusa group, to which the *C. Elaphoides* may be referred, a species wherein (normally) each of the ordinary two coronal prongs of the Axine group merely *bifurcates*, with a tendency to subdivide further; the *C. Elaphoides* has, besides, the shorter and thicker body of the Axines, and no disk surrounding and ascending above the tail, as in the true or Elaphine Stags. Its naked muzzle, also (if I mistake not), is more expanded, as in other Axines.

Figures 1 to 6 represent some picked antlers of the Wapiti Stag (*Cervus Canadensis*); 7, of the young Jerræel Stag (*C. Wallichii*); 8, 9, of the Stag of Kashmir (*C. Wallichii* ?); 10, of the young *Maral*, or Persian Stag; 11, of the great Hungarian Stag; 12, a singular and very abnormal variety of the European Stag.

Figure 2 represents a Wapiti antler, with the basal tines a little removed apart, which is very seldom the case in this species, though common in *C. Elaphus*; fig. 3, represents a trifurcating crown, which is also rarely seen in the Wapiti; fig. 4, either wants the median tine, or has it removed so high up the beam that it appears part of the crown; figs. 8, 9, representing an antler of the Kashmir Stag, scarcely differ from fig. 2; fig. 10, representing an antler of the young Persian species (drawn from memory only, though I pledge its essential correctness), is remarkable for having its basal tines united for a short space where they issue forth, and may be compared with fig. 7, illustrating what I consider to be the corresponding age of *C. Wallichii*; in the northern European Stag (*C. Elaphus*), and a very nearly allied, but larger, fossil congener, the basal tines are even commonly as much separated as in fig. 11, though typically approximated as in the Wapiti; fig. 12, an abnormal antler of *C. Elaphus*, wants the second basal tine, which, however, is not unusual in young animals of this species, and presents a strangely ramifying crown; the specimen is in the British Museum.





Proceedings of the Asiatic Society.

(Wednesday Evening, 1st September, 1841.)

The Honorable Sir E. RYAN, in the Chair.

HENRY WALKER, Esq. Bengal Medical Service, and FLETCHER HAYS, Esq. 62nd Regt. N. I., Assistant Governor General's Agent, Saugor, proposed at the last Meeting, were ballotted for, and duly elected, to whom the necessary communications of their election and rules of the Society for guidance, were ordered to be forwarded.

The following gentlemen were proposed as Members, viz :—

The Honorable A. AMOS, Esq. by the Honorable President, seconded by the Honorable H. T. PRINSEP, Esq.

ROBERT BARLOW, Esq. C. S. by the Honorable H. T. PRINSEP, Esq. seconded by the Honorable President.

C. G. MANSEL, Esq. C. S. by the Honorable President, seconded by the Secretary.

Library and Museum.

Books received for the Library of the Asiatic Society, for the Meeting on the 1st September, 1841.

Illustrations of the Literature and Religion of the Budhists, by H. B. Hodgson, Esq. Serampore, 1841, 1 vol.

Discourse touching the Spanish Monarchy, London, 1654, 8vo. 1 vol.

Calcutta Christian Observer, September 1841, New Series, vol. 2d, No. 21, pamph.

Annals and Magazine of Natural History, May 1841, No. 43, London, ditto.

Calcutta Monthly Journal, July 1811, ditto.

Report on the Statistics of Western Australia, in 1840, Perth, Western Australia, 1841, ditto.

Oriental Christian Spectator, July 1841, Bombay, vol. 2d, No. 7, ditto.

Hammer Purgstall's Falkner Klee Wien, 1840, 1 vol.

Read the following report of the Officiating Curator for the month of August last :—

H. TORRENS, Esq.

Secretary, Asiatic Society.

SIR,—For the month of August I regret to say that illness and debility, during ten or twelve days, have prevented my doing much that I had in view previous to the arrival of Mr. Blyth, who may now be daily expected.

Geological, Mineralogical, and Paleontological Departments.—We have received here from Government several limestones from Cachar, with other specimens, collected by Lieut. BIGGE, Assistant to the Agent to the Governor General on the N. E. Frontier, with their analysis as limestones by Captain TREMENHEERE. I find, however, that they are of much higher interest than as mere limestones; for three if not four out of eight contain organic remains! I have not been able to identify the localities, which I believe to be farther to the Northward and Eastward than Dr. M'CLELLAND's valuable discoveries in that quarter, being from Cachar, (the Mukir range,) but the fact is important, if only as corroborating or connecting other discoveries.

We have also from Government a continuation of the collections made by Dr. WALKER in the Chinnoor Sircar, Nizam's territory : consisting of shale, coal, argillaceous limestone, sandstone, anthracite, &c. &c; with a map of the Godavery from Chanda to below Mungapett, shewing the site of the coal, &c. &c. I have, I fear,

omitted to mention, in the July Report, the presentation of a copy of Mr. TASSIN's large map of Bengal, by Government.

The printers are, I grieve to say, as dilatory as ever. I have only been able to obtain one proof, a day or two ago, for the whole month.

Osteological.—The skeleton of one of the samurs is in preparation.

Ornithological and Mammalogical.—Nothing new to report.

Botanical.—I have the pleasure to add here to my former report on our Lichens, that we have obtained a second, purple colour from the Society's Himalaya specimens; being No. 9, marked in my paper as an "orange crimson." I look with confidence to a third, if not a fourth, which, out of 19 sorts, will be a rich harvest. It appears that some months are required for the change from crimson to purple, as in the preparation of archil and cudbear in Europe.

We are also in this department indebted to Government for a valuable collection of gums, hemp, wax, silk, &c., from the Nizam's territories. I have handed to our Secretary a note on some articles sent on requisition by him, from Khorasan, (*via* Sindé,) by Lieut. POSTANS, amongst which are a new yellow dye, a new species of gall nut, and a very valuable sort of cotton, (the Nurma cotton,) which I have since found is highly prized in Malwa, where it is known by the same name. It is hoped this will prove of importance in the hands of Captain BAYLES and the American experimentalists. That no time may be lost, a memorandum has been transmitted to Government on this subject.

Museum of Economic Geology.—We have at length obtained all the new cases from our contractors. The original collection sent out by the Court of Directors is arranged; and I have added, from our own neglected stores, a valuable series of silver ores from Peru, and the remains of Captain FRANKLIN's iron ores from Bundelcund, with specimens of gold, tin, copper, manganese, lead, &c. which can be fully spared; and are, in fact, utterly useless and lost as now lying dispersed, while here they form objects of both interest and utility, as being specimens of, or incitements to search for, our Indian resources, placed where they can be properly exhibited and studied.

The Donations to the Museum have been as follow:—

Scull and horns (imperfect) of Cervus Muntjack,	} W. A. Peacock, Esq.
(Barking Deer,) from the Tipperah Hills,	
The Choudonah Parrot, (Psittacus),.....	Mr. L. Swaries.
A collection of Rocks and Minerals from Arracan,	} Js. Hyland, Esq.
to accompany a paper presented at the last	
Meeting,	
Rocks and Minerals, from Cachar and the Naga	} Lt. Bigge, Asst. Agent G. G.
territory,.....	
Rocks and Minerals, collected by Dr. Walker, Ni-	} Government.
zam's territory,	
A collection of Gums, Hemp, Wax, Silk, &c. from	} Government.
the Nizam's territory.....	
Mr. Tassin's large Map of Bengal, &c.,	Government.

I am, Sir,

Yours very obediently,

H. PIDDINGTON.

Museum, 1st September, 1841.

Read report on some Articles of Trade sent from Khorasan by Lieut. POSTANS, and a memorandum on Nurma Cotton, by the Officiating Curator. [Inserted in the present number.]

Read the following letter of 31st August last from the Officiating Curator, reporting result of his examination of Lieut. BIGGE's specimens.

H. TORRENS, Esq.

Secretary, Asiatic Society.

SIR,—Upon examining Lieut. BIGGE's specimens, which illness had prevented my doing earlier, I find three out of four of his limestones contain organic remains, and these I should say marine!

This is of very great importance as a geological fact, as it carries Dr. M'CLELLAND's discoveries much farther to the Eastward. At all events, a quantity of these specimens would be most highly desirable, both for the Museum, and for the Museum of the Honorable the Court of Directors, say three or four maunds weight of as many sorts of them as can be procured, so as to enable European geologists to compare with their collections.

You can then, doubtless, recommend this to the attention of Government, and through that channel he will probably pay more attention to the recommendation than if simply from the Society, which I fear is not in the best credit with collectors, of late years.

Yours very faithfully,

31st August, 1841.

H. FIDDINGTON.

P.S.—These are the specimens sent us from the Government Secretariat, with Captain TREMENEERE's analysis, who seems quite to have overlooked the locality, for he notices them only as limestones!

Read letter, No. 1274, of 12th August last, from Mr. Secretary BUSHBY, forwarding 30 copies of the Cochinchinese Dictionary and Vocabulary for distribution.

Resolved—That 25 copies of the Dictionary be forwarded to Messrs. W. H. ALLEN and Co. of London, with instructions to distribute them to the learned Societies and individuals in Europe, agreeably to the wish of the Government, and that five copies be retained for the use of the Library of the Society.

Read a letter, No. 792, of the 25th August last, from Mr. Secretary BUSHBY, intimating the authority to the Coal Committee to make over a package received from the Court of Directors, containing specimens of copper ore, exhibiting the various stages of its reduction, for deposit in the Museum of Economic Geology.

Several specimens of snakes, minerals, &c. were presented by Lieut. M. KITTOE, accompanied with the following letter from that Officer :—

To H. TORRENS, Esq.

Secretary to the Asiatic Society of Bengal.

MY DEAR TORRENS,—I had hoped to have been able to have attended the Society's meeting this evening, and have presented the few specimens of snakes and minerals,

&c. as per annexed memo. which I now send, but a relapse of fever prevents me. I regret that I should not have been able to have brought a finer and more extensive collection, but there are reasons for it, which the least mentioned the better.

I would beg to invite the attention of any member versed in mineralogy to the minerals; they belong to the iron formation of the Keunjhur Mountains. and appear uncommon.

The fish is, I fancy, a nondescript species of carp, it is a stone-sucker like the loach, and has like feeders or appendages to the mouth; it is like the "kalabanse," which is also a stone-sucker, but it differs in size, colour, and the shape of the mouth in particular; it is sometimes caught as high as $2\frac{1}{2}$ to 3 seers in weight. The specimen from which the drawing was taken was about $1\frac{1}{2}$ seer or more. I have never seen this in any other river but the Brahmen's, which abounds in fish, and this is the second nondescript fish I have found in that river.

The squirrel is quite destroyed; it has lost three inches of its tail, which quantum was of a pale slate colour. I believe the animal to be full grown, as there is a considerable variety of the tribe in the Keunjhur Mountains; perhaps this specimen is sufficiently perfect to admit of being properly described by CANTOR or M^CLELLAND, to whom it is my wish that all the specimens be sent, for examination and nomenclature. The snakes must go to CANTOR. There are several which are well known. I brought them merely to increase the stock, to enable the Society to furnish duplicates to other Museums. The birds' eggs are damaged; they will do in the room of better specimens.

The book I send, I consider to be a curiosity.

Yours sincerely,

M. KITTOE.

CALCUTTA, 1st September, 1841.

Minerals.

Three specimens from the iron formation of the Keunjhur Mountains.

Two Ditto of serpentine and one green quartz (?) from Juspoor.

Ditto of an elegant squirrel, Keunjhur hills.

Ditto 6 snakes, and a kind of scorpion, also lizard, Keunjhur and Mohurbhunj jungles.

Ditto broken, and of a hawk, called in Hindoostan "Luzzur."

An unfinished drawing of a fish caught in the Brahmen's river, believed to be a nondescript.

An ancient work in one volume, with manuscript marginal notes, entitled "A Discourse touching the Spanish Monarchy," translated from the Latin edition by CAMPANELLA, a Spanish monk, in the 16th century, printed in 1654.

A war-cap adorned with human hair, and a crest of the tail hair of the elephant, worn by the chiefs of the Naga tribes, together with some Naga spears and swords, were presented by Mr. MILNE, late in the employ of the Assam Tea Company.

The Secretary noticed the safe arrival of the taxidermist, who had been sent to Chybassa, and placed under Lieut. S. TICKELL, in pursuance of the plans the Society have in view, of placing taxidermists throughout the country, for the preparation of objects collected by Members, who take an interest in the subject.

For the presentations and contributions, the thanks of the Society were accorded.

At a Special Meeting held, on the 24th September 1841, of the Committee of Papers—

The Hon'ble Sir E. RYAN, in the Chair.

Read letter from Mr. H. PIDDINGTON of 9th September 1841, reporting that on the 6th idem he had delivered over charge of his departments of the Museum of the Asiatic Society to Mr. E. BLYTH.

Read the following correspondence with that gentleman:—

TO EDWARD BLYTH, Esq.

SIR,—As you have now taken charge of the Museum of the Asiatic Society of Bengal, in your quality of Curator of that Museum, I am directed by the Honorable the President to address you, for the purpose of pointing out those particular points to which the Society would wish you to give your first and most earnest attention.

2. The Hon. the President in writing to Professor WILSON regarding the qualifications of a Curator for the Society, (a reference which resulted in procuring for the Society the advantage of your service,) made use of the following terms, in specifying what was required.

“We think the office should be filled by a person who can give to the Museum his principal attention, and be in attendance from 11 to 4 P. M. The Salary is 250 Rs. a month. As to duties, we require monthly reports on the state of the Museum. We do not allow specimens to be removed from the Museum. Our Museum has, in fact, two departments. The Oriental Antiquities, Numismatics, &c. &c. we must leave to our Oriental Secretary,—but as to every thing connected with Natural History in our Museum, we look to our Curator,—all this is specified in a paper in our Journal, or rather in the minutes of the Proceedings of the Society for December 1839, when the question was fully considered.”

3. The Hon. the President has desired me to enter the above at length for convenience of reference, although well aware that you must, in all probability, have already perused the passage in the original letter to Professor WILSON, before completing your arrangement with the Professor on the part of the Society.

4. The paper referred to, as containing a detailed statement of the Curator's duties, you have doubtless also seen. I append it (as published in No. 96, Asiatic Society's Journal, December 1839, p. 1060.), for reader reference.

5. “The first object of the Society,”—it is there stated—“in remodelling its Museum, should be to form a grand collection of minerals and fossils, illustrative of the Geology, Geography, and Palæontology of our British Indian possessions.”—This great object it is the anxious and earnest desire of the Society to see carried out; and with the Museum of Economic Geology now added to our own, and the very large, but still much disordered collections belonging to the Society, it is believed that opportunities exist of forming the basis, at any rate, of a great Mineralogical and Geological Collection, useful in every and all respects to the scientific Student, the Miner, or the Agriculturist.

6. The Hon. the President is most anxious to know, what course you propose to adopt in carrying out the design of the Society. The late officiating Curator, during the short period of his holding the office, has, as you will observe, done much towards the

classification of many of the superb collections belonging to the Society. His patience and energy have led to the recovery of many specimens supposed to have been lost, and to the restoration of more than one collection, such as Dr. GERARD'S, from the Himalaya, unique in rarity and value.

7. The Hon. the President does not doubt but that your ability and scientific knowledge will be steadily directed towards carrying out the general objects of the Society, but being specially interested, as in possession of the wishes of that body, upon the important question above noted, and being led to believe moreover that a different branch of science is that to which you are from habit and inclination most ready to devote your principal attention, he has directed me to request that you will oblige him by stating how far you consider yourself qualified to undertake the main duties of the Curatorship, (as stated in the accompanying paper,) including the charge, conduct, and advancement of the formation of the Museum of Economic Geology.

8. I am desired to observe, that the Society of which you are Curator, has always in view the interests, in the first instance, of India, as respects the elucidation of her natural phenomena, the development of her resources, and the advancement of knowledge in all branches of science whereby this country may be benefited. The Society works therefore for itself, and not subordinately to any other body whatsoever. The first fruits of all labour by its Members, or its Office-bearers are due to it; the subsequent results are of course available for general uses.

9. I am directed to request that you will favor the Hon. the President with a reply at your early convenience, and have the honor to be,

Your obedient servant,

H. TORRENS,

Secretary, Asiatic Society of Bengal.

TO THE SECRETARY OF THE ASIATIC SOCIETY.

SIR,—I beg to acknowledge the receipt of your communication, detailing the objects which it is the desire of the Asiatic Society should more prominently engage my attention, in endeavouring to fulfil the duties of Curator to their Museum; and I fully trust that, with the great facilities afforded me in maturing what acquaintance I already possess relative to the multitudinous and highly diversified objects of investigation committed to my charge, I shall, in reasonable time, be able to afford entire satisfaction to the Society, by carrying out their wishes in every department, which falls within the scope of my duties to investigate.

When, however, it is remembered that these duties comprise various departments of the general subject of Natural History, to which in Europe the principle of division of labour is applied, and that it is rare to find an individual minutely conversant with the details of two or more of these departments, to the extent which I consider necessary to enable me to discharge efficiently what is generally expected from an individual filling the office of Curator to a Museum, I think I may crave some indulgence on the part of the Society, if I do not, at the very first, prove alike proficient in every one of these several departments, confidently appealing to the experience of any practical naturalist, for an acknowledgment of the reasonableness of the plea which I have here ventured to offer.

It is in the Mineral Department, unfortunately, that I am at present less qualified, by previous study, to devote my immediate and first labours advantageously for the

Society; but with the opportunities for study which are now before me, and with the liberal encouragement and support I may reckon upon receiving, I do not fear but that I shall soon render myself competent to discharge that portion of my duty which relates to the efficient management of the Museum of Economic Geology; this being a subject in which I feel the liveliest interest, and with the high importance of which I am deeply and thoroughly impressed.

In all that relates to the determination of organic forms, recent or fossil, I hope to be already able to meet the wishes of the Society, having heretofore more particularly devoted myself to this exceedingly comprehensive branch of study, which has found me very ample employment in attaining to what information on the subject I at present possess.

With great respect,

*Asiatic Society's Rooms,
Calcutta, 22nd September, 1841.*

I am, Sir,

Your obedient servant.

EDWARD BLYTH.

Resolved, with special reference to the letter from Mr. E. BLYTH, that he be put in charge of the office of Curator, upon the understanding that the appointment will be made permanent, if at the end of twelve months he has qualified himself for carrying out the intentions of the Society respecting their Museum, as set forth in the Proceedings of the Society, recorded in the December No. (96) of the Asiatic Society's Journal, 1839.

Ordered,—That a copy of the foregoing resolution be communicated to Mr. E. BLYTH.

JOURNAL

OF THE

ASIATIC SOCIETY.

Description of a Persian Astrolabe, submitted to the Asiatic Society by Major Pottinger. By J. MIDDLETON, ESQ. Principal of the Government College at Agra.

The Astrolabe, whose name sufficiently expresses the purpose which it was originally intended to subserve, seems at first to have been of very simple construction, consisting of two concentric rings of brass, the one revolving within the other, upon pivots fixed in their exterior and inner edges respectively. The instrument thus formed, was so placed, that its exterior circle coincided with the plane of the meridian; the interior one was then made to revolve till the shadows of that part of the limb, towards the subject of observation, overlapped that of the opposite part, when the opening of the rings shewed the meridional distance of the luminary. By a different adjustment of this simple instrument, the zenith distance of the sun, and hence the latitude of the place, could be nearly ascertained. Subsequently, the number of rings of which the instrument was composed, was augmented until not only the meridian, but also the Equator, the Ecliptic, the Colures, &c. were represented, and thus it was when Ptolemy found it, who established the principles, and contrived the means, by which to project the whole upon a plane surface; and to this projection he gave the name Planisphere. Of the modification of the Astrolabe the Arabs availed themselves, and were enabled by their improvements in science, especially in Trigonometry, to raise it to a degree of perfection which sufficed, during several centuries, both in Asia and part of Europe, for

the somewhat unscrupulous scientific purposes of those times. To what extent the Astrolabe may be now used by observers in Central Asia, I am unable to ascertain; but among Arab navigators it has given place, generally, to the quadrant or sextant, upon which it has conferred its name; the latter being called the *Belatee* (or foreign) *Oosturlab*. Though but little that is new can be said at the present day on the subject of the Astrolabe, about which volumes have already been written, yet the one which in this article, I propose to describe, is so superior in its kind, and displays a degree of taste and accuracy of execution, which we would scarce be prepared to expect from Central Asia, about a century and a half ago;* and it is at the same time so crowded with facts subservient to science, or superstition, that I am inclined to believe a short description of it will not be unacceptable. As to the plates, I may say generally, that for the Persian names of the planets and signs, I have substituted the Greek symbols, which modern times have adopted, and have changed for the Arabic numerals, those used by ourselves. To this substitution, I have necessarily sacrificed the elegance of the original inscription, in which the light and graceful forms of the Persian characters are tastefully intertwined with flowers. The object I had in view, constrained me to this sacrifice,—and that was, to present, in as simple and general a form as possible, an intelligible view of the instrument.

The Astrolabe in question was brought from Herat by Major Pottinger; it consists of a circular piece of brass, about eight inches in diameter, and three-fourths of an inch thick, being on one side so hollowed out, as to contain several plates of brass, upon either side of which Planispheres are described, according to the latitudes of the principal places of Mahomedan power or veneration. On its upper limb is a triangular piece of brass, not represented in the plate, through the apex of which a ring is freely passed, by which, for purposes of observation, the instrument may be suspended in the vertical. The back of the Astrolabe, with exception of the triangular part, above mentioned, is represented in Plate I. Fig. *a*. while the face is partially shewn in Plate II. I say partially, because the outer edge of the

* NOTE.—The Astrolabe was procured by Major Pottinger from a party, who had gotten possession of it on the flight of the original owner from Herat, some time previous to the last siege of the town by the Persians.

recess, in which the trelliced circle represented by Plate II. revolves, is divided into 360° , a mode of graduation well known to the ancients I have also refrained from introducing drawings of all the Planispheres; since the doing so would have swelled the number of plates to fourteen, without, at the same time, disclosing a new truth, or illustrating an old one.

Premising these general observations, I shall now proceed to more particular explanation, throughout which, agreeably to my plan, I shall abstain from introduction of the abstract forms of science. I shall also, for greater perspicuity, subdivide my description, and arrange it under heads corresponding with the purposes which the instrument is intended to serve; viz. those of Astronomy, Astrology, Geography—and first of its

Astronomy.—I have already said, that but little new can be adduced on the subject of the Astrolabe, and the same remark applies to Arabian science generally. The admirable works which the French *savans* have conferred upon the world on the Astronomy of the Ancients, leave but meagre gleanings for whoever may follow, especially in respect to Arabian astronomy. I shall therefore in the following remarks confine myself to a description of the astronomical uses for which the instrument in question was probably intended, and refer such who would acquaint themselves with the principles employed in its construction, to the “*Astronomie Ancienne*” of Delembre.*

In Plate I, which represents the back of the Astrolabe, the upper limb is divided from the left and right; or, as the Arabs express it, from the east and west points, into two equal parts, terminating on the highest, or zenith point; these quadrantal arcs are again subdivided into ninety equal parts or degrees, “the use of the limb thus graduated, is for observation of the altitudes of celestial bodies, whether for ascertainment of the latitude, or of the time. The instrument, it is true, might be employed with even greater accuracy for the determination of terrestrial heights and distances, but I am not aware that the Arabs ever do employ it for such purposes; the manner in which the Astrolabe is used, is this: the label, or index, Plate I. Fig. *b*. is fixed upon its back by its axis *c*, which not only secures it there, but

* qu: Bailly? Ed.

also passing through the centres of the Planisphere discs, together with the trelliced plate (Plate II) on the face, binds the whole firmly and compactly. The observer now suspends the instrument, by holding the ring mentioned above in his right hand, the line passing through the origin of the graduated *arcs*, and the centre thus being horizontal, while that through their terminus, and at right angles to the former, is necessarily vertical. The object to be observed is now made to coincide with the plane of the quadrants, and the label is turned towards it, until a ray of light pass from it to the eye of the observer, through the perforations of two small plates projecting from the label near its ends, and at right angles to its length, (Plate I. Fig. *b*.) The arc of the quadrant between the horizontal line and the edge of the label, will evidently be the altitude required. There are undoubtedly several sources of error, which would render such an instrument unfit for the purposes of modern science, but with those for whose use it was originally intended, its imperfections would be unimportant. It is evident, that in the observation described, the altitude obtained is too great by the whole amount of refraction, an error which becomes considerable, when the object is near the horizon. I am of opinion, to, that the error in reading off the altitude would not be sufficiently allowed for, when repeated observations are impracticable, under 5.'

Another ground of inaccuracy would necessarily be the difficulty, almost impossibility, with such an instrument of taking the centre in observations of the sun. These errors, springing from different sources, might sometimes, it is true, correct each other to a certain extent, but this vague probability must, of course, be insufficient to produce confidence in the instrument.

The parallel straight lines on the left of the upper limb are semi-almacanthers, or semi-circles of celestial altitude, seen on their edges, while the concentric *arcs* on the right seem to be intended to connect those signs which have north declination with those which, in that respect correspond with them towards the south; such a table is committed to memory by Asiatic astronomers, to which the neat arrangement is well suited.

Under the central line, and symmetrical with the centre, are two rectangles, the one within the other, and whose length is twice their breadth. The figures alluded to, are immediately recognizable by

terms—horizontal shadow,—vertical shadow,—at their longer and shorter sides, respectively. These rectangles are each divided into two equal parts by the production of the vertical line above. They are next divided on the lower edge from the centre towards the right into twelve, and towards the left into seven equal parts. The vertical edges are also submitted to similar graduation. The meaning and principle of these graduations the next paragraph will explain.

To the Arab, as to the Hindoo astronomer, the *gnomon* was an important, if not an indispensable auxiliary. Some divide the shadow into twelve, others into seven equal parts, according to fancy, or the length of the *gnomon* employed. This scale, whether divided into twelve or seven parts, is of the same length as the *gnomon* itself, and is consequently only capable of measuring altitudes within the limits of 0° and $45''$, or 45° and 90° , according to the situation of the plane upon which the *gnomon* stands. In order to compensate for this insufficiency, two *gnomons* are used, one parallel to the horizon, and one vertical to it. At sun rise, it is evident, the shadow of the vertical *gnomon* is indefinite, and is for long after incapable of being used as a measure of altitude. Again, at the time of sun rise, the shadow of the horizontal *gnomon*, pointed as it is towards the east, is zero, and gradually increases as the sun ascends, until he has attained the altitude of 45° , when the shadow reaches the limit of its scale, and from that time ceases to be available as a measure of altitude. Whilst the shadow of the horizontal *gnomon* has been thus slowly stretching itself, that of the vertical has contracted to the further end of its scale, and is now prepared to perform the functions for which the other ceases to be qualified; and the same process is repeated, but in an inverse order, till the going down of the sun.

The scales by which shadow is measured, are sometimes made five times the length of the *gnomon*, the shadow being then divided into sixty and thirty-five equal parts; but as such a scale could not be laid down upon the instrument, without causing embarrassment, or injury to its compactness, the following ingenious artifice is resorted to. In construction of the Astrolabe, the horizontal scales, just described, are produced to the right and left respectively, the former being then divided into sixty, the latter into thirty-five equal parts. This done,

the edge of a geometrical rule is passed over the centre of the instrument and each of the divisions successively, and the points in which the same edge cuts the limb are marked ; the numbers corresponding to them on the original scale are then affixed, and thus the rectilinear scales have been projected into the more convenient form of circular ones, seen in the exterior demi-annulus of the lower limb. It is plain that, by means of these scales and the quadrants of altitude, the height of the sun being given, the length of the shadow may be found, and reciprocally.

Having thus described, however imperfectly, the astronomical uses of the back of the Astrolabe, I proceed next to its face, which exhibits a stereographic projection of the ecliptic on the plane of the equator. I should here mention, that Plate V. shews the method of construction here employed. If I recollect right, Delembre gives a less accurate method by which he believed Arabian astronomers effected this projection, and on this account I consider this a very accurate and neat plate, too important to omit, and by means of which, when fixed over the Planispheres by the common axis, yet left free to revolve, many interesting and useful problems, for which globes are used with us, may be readily performed. The numbers on its fancifully formed angular points correspond with those of the list of stars, with which this part of my description will conclude. On the instrument itself, the names, as given in the table, are neatly engraved ; this the flexibility of the Arabic character, and its susceptibility of packing, permitted ; with ours, on the contrary, it could scarce be done, and I have therefore preferred on that, and other grounds, the method of reference by numbers. I believe, observations regarding these stars should more properly come under the astrological head ; but as they are used for ascertaining the time of the night, &c. and as there is besides something very interesting about them, I prefer reversing them from that situation.

Ulug Beg, whose authority we have given for the position of the stars, was king of Samarcand, and flourished in the early part of the fifteenth century. He was an eminent astronomer ; and the accuracy with which his observations were made, is sufficiently proved by the fact, that on making computation from his data, for the present time, I could readily discover, with one exception, the stars inscribed on the plate. The

learned Hyde, who gives a Latin version of Ulug Beg's tables, which was obligingly lent to me by our worthy Secretary, in his able preface to that work, says of the author, "Inter distractiones animi et *repetita* regni negotia administranda ad subtiliora in scientiis investiganda se applicuit." And again quoting a contemporary historian and panegyrist, he says, "At celsus iste animus etsi in summo rerum fastigio esset constitutus tamen in pulverem mathematicum descendere non dedignatus esset." This historian, obviously, did not understand that the royal astronomer while thus engaged, was but drawing pleasure from its purest source, and inscribing his name on the bright heavens, in a character which would not soon be forgotten. We are informed by Ulug Beg himself, that for the observations, the result of which appear in his tables, he caused to be constructed a quadrant of great radius, "cujus radius altitudine Templi Sanctæ Sophiæ æquaret," and that the latitudes and longitudes of the stars thus obtained, were to serve as data for future computations, the method of effecting which, he himself supplies.

"Stellarum loca in tabulis designavimus pro initio anno Hejyra 841, at quovis tempore quis possit stellarum loca invenire cum singulis septuagenis annis solaribus per *annum* tantum gradum moveantur." The addition of 1° for every 70 years is not quite correct, as the precession of the equinoxes is about 1° in 72 years nearly, on the average, since the time of Ulug Beg; at present it is 1° in 71.66 years. Allowance is also to be made for the diminution of the obliquity, a fact which appears to have been unknown to ancient astronomers.

No.	Names.	Names with us.	Longitude accord- ing to Ulug Beg.	Latitude accord- ing to Ulug Beg.	Magnitude accord- ing to Ulug Beg.
1	ظهر الدب	Dubhe, ..	4° 7' 25'	49° 24'	2
2	قائد	Alioth, ..	5 19 10	54 9	2
3	سماك راسح	Arcturus, ..	6 16 31	31 18	1
4	نيرفك	Alphekka, ..	7 4 34	44 30	2
5	نسرواق	Lyra ..	9 8 19	62 0	1
6	منقار الدجاجه	Albire ..	9 24 25	49 12	3
7	ذنب الدجاجه	Arieded, ..	10 28 46	59 42	2
8	قطب برج	Pole of the ecliptic,	.. ..	90 ..	...
9	كف الخضب	β Cassiopea, ..	0 28 1	50 48	3
10	مروق الثريا	α Persei, ..	1 25 7	29 21	2
11	راس غول	Algol, ..	1 18 55	22 0	2
12	جنب السلسله	Mirach, ..	0 23 13	25 36	2
13	عين حوق	Capella, ..	2 14 43	22 42	1
14	راس السكبه	α Ophiuci, ..	8 15 13	25 51	3
15	عنق السكبه	α Serpentic, ..	7 14 25	25 48	3

No.	Names.	Names with us.	Longitude according to Ulug Beg.	Latitude according to Ulug Beg.	Magnitude according to Ulug Beg.
16	نسر طایر Nusre tayer,	Atair, ...	9° 24' 10"	29° 15'	2
17	ذنب العقاب Zunub ul oqab,	ζ Aquilæ,	9 12 31	36 15	3
18	منكب الفرس Munkeb ul phurs,	Sheat Alperas,	11 21 37	30 51	2
19	فم الفرس Phummul ul phurs,	Enir, ...	10 24 28	22 0	3
20	عيون الثور Aiwun ulsoor,	Aldebaran,	2 2 31	5 15	1
21	قلب الاسد Qulb ul asud,	Regulus, ...	4 22 13	0 9	1
22	ساق الاسد Saq ul asud,	* ...	.. ..	.. ..	..
23	صوفة Surphuh, ..	Deneb, ..	5 13 49	12 0	1
24	سماك اعزل Semak eazul,	Spica Virginis,	6 16 10	2 9	1
25	كفة شما لي Kuyh e Shumali, ..	β Libræ, ..	7 11 58	8 45	3
26	كفة جنوبي Kuph e junooobi, ..	Zubene Sehamedi,	7 7 52	0 45	3
27	قلب العقرب Qubbul uqurb,	Antares, ..	8 2 16	4 30	2
28	ذنب الجدي Zunub ul judee, ..	γ Capricornus,	10 15 28	2 15	3
29	فم القيطس Phummul quytus, ..	γ Ceti, ..	1 2 10	12 18	3

* Regarding this star, I am uncertain; I do not meet with it in Ulug Beg's tables, and of other authorities whom I have consulted, some do not mention it, others think that Arcturus is meant.

No.	Names.	Names with us.	Longitude accord- ing to Ulug Beg.	Latitude accord- ing to Ulug Beg.	Magnitude accord- ing to Ulug Beg.
30	صدر القيطس	Sudur ol quytus, .. ε Ceti,	0° 22' 37"	25° 42'	4
31	ذئب قيطس جنوبي	Zunub e qutus e ju- noobi, β Ceti,	11 25 25	21 0	3
32	داليمني	Yud ul yumno, .. Betelgeux,	2 21 13	16 45	1
33	رجل اليسري	Rejel ul yusra, .. Kijel, ..	2 9 25	31 18	1
34	رجل اليمني	Rejel ul yumna, .. ♄ Orionis,	2 18 40	33 21	3
35	يد اليسري	Yud ul yusra, .. Bellatrix,	2 13 34	17 15	2
36	مسافات النهار	Musaphut ul nuhur, .. γ Eridani,	1 16 40	33 15	3
37	ساق ايهن ساكب	Sageayumune sakub, Fomalhaut,	10 26 19	21 24	1
38	شعوري يمانى	Sherai yemani, .. Sirius,	3 6 19	39 30	1
39	شراي شمالي	Sherai shumali, .. Procyon,	3 18 22	16 0	1
40	طرف اسفينه	Turpho saphynah, .. ζ Navis,	4 3 10	43 33	3
41	فرد اشجاع	Phurd o shijay, .. Alphard,	4 19 31	22 30	2
42	قاعدۃ الباطية	Qaed utool batyah, Alkes,	5 12 37	22 0	3
43	جناح الغراب	Junah ul ghorab, .. γ Corvi,	6 2 46	41 18	3

Astrology.—This is a subject which, I am aware, has but little interests for us; yet I should have but unsatisfactorily completed the work I have undertaken, had I passed it over. Among the Mahomedans of India, too, so far as my information enables me to judge, Astrology is but little respected; some of the most intelligent of them, whom I have met with, and questioned on the subject, evidently disliked the inquiry; and generally replied to the effect, that there is no power in the creation but that of the Deity, and that it is against the religion of a true Mussulman to believe in other influences. It is however probable, that extreme ignorance on subjects connected with science may have as much to do with their disbelief, as rigid piety. What degree of importance may be at present attached to it in Central Asia, I am not aware; if, however I may judge from the care and finish which have been bestowed on this part of the Astrolabe, and its completeness, it is considerable; and I remember Major Pottinger stating, that the instrument was chiefly used for Astrological purposes, by the person from whom he obtained it. Towards the South West, it appears to have still its hold, since Lamartine informs us, in his Travels in Palestine, that on his visit to the eccentric Lady Esther Stanhope, he thought he could detect the secret of her surprising influence over the lawless tribes of the desert, in her enthusiastic belief, and apparent skill, in the sciences of Astrology and Palmistry.

Among the Hindoos it is still implicitly believed in, and the necessity which this imposes on those who profess it, of being acquainted with the prominent facts of Astronomical science, has served to continue down to our times *disjectæ membræ* of their ancient system, which otherwise, like the rest, would probably have been lost. I shall now proceed to explain, what part the Astrological constants engraved upon the Astrolabe, (Plate I. Fig. *a.*) bear in the casting of a Horoscope, be it natal or annual.

The interior of the rectangle, about the sides of which, as already explained, are distributed the divisions of shadow, as also the four interior demi-annuli of the lower limb are entirely devoted to Astrological purposes.

The rectangle contains the celestial Trignons, so called from their positions in the ecliptic occupying the vertices of equilateral triangles, together with the Planets which govern them by day, and those

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The rectangle contains the celestial Trignons, so called from their positions in the ecliptic occupying the vertices of equilateral triangles, together with the Planets which govern them by day, and those

which govern them by night. Their influences are expressed in general terms in the margin. Their order in the drawing is, according to that of Persian writing, from left to right, and hence perhaps the following arrangement will be found more plain:—

Trigons.			Governing Planets by Day.			Governing Planets by Night.		
γ	♋	♊	☉	♈	♉	♈	☉	♉
α	♌	♋	+	♍	♊	♍	+	♋
Π	♎	♌	♋	♎	♈	♎	♋	♈
♏	♍	♎	+	♏	♉	♏	+	♉

By the Hindoo distribution, the twelve signs constitute one Trigon, each of the vertical column constituting a side.

The inner demi-annulus contains the lunar mansions; they are 28 in number, and extend over the whole ecliptic; each representing, proximately, the space passed over by the moon in one day. Their names are as follow:—

No. of Mansions.	Names of the Mansions.	No. of Stars.	No. of Mansions.	Names of the Man- sions.	No. of Stars.
1	شرطین	2	15	غھفر	4
2	بوتین	3	16	زبانا	2
3	سریا	7	17	اکیل	3
4	دبران	5	18	قلب	1
5	هقائ	3	19	شولہ	2
6	هانائ	5	20	نایم	3
7	زراع	5	21	بلدہ	6
8	نصری	2	22	ذابج	2
9	طرفہ	1	23	بلیج	2
10	جیبہ	1	24	ساد	1
11	زبرہ	2	25	اکھبہ	Several.
12	صوفہ	1	26	مکدوم	Several.
13	عوا	4	27	موغر	1
14	سماک	2	28	رشا	Several.

These mansions occupy a prominent place in the Astrological system; certain actions are to be annually performed, certain to be avoided by a person throughout life, according to the mansion in which the moon was at the time of his birth. With the Hindoos, each mansion is divided into four equal parts, to each of which appertains exclusively a certain letter or syllable, according to which the name of a person born during the occupancy of such portion, has its commencement determined. For instance, the late Lion of the Punjab must have been born while the moon was in the 1st quarter of the 15th mansion, as to that alone belongs the letter **र** with which his name **रणजीत सिंह** commences. There are many other attributes which they possess, but which it would be tedious and unprofitable to mention. The names of Mahomedans are determined by the Koran, as the *sortes* of old were by a reference to Virgil.

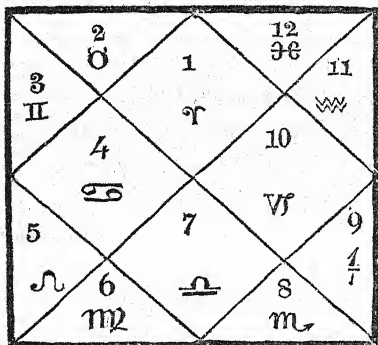
The next demi-annulus contains the faces or aspects of the planets, the nature and importance of which are as follow:—Each planet views with full power the sign opposite to that in which he is, if in the 4th and 10th signs with one half, or so on.

The full power of a planet is represented in the plate by the number 60, the half by 30, &c. &c.

The third demi-annulus contains the signs of the Zodiac themselves, to which, as will be seen, the others are referred.

The fourth, and last, is occupied by the *hudoos*, or houses of the Planets, which I have termed, not happily I find, “comparative influences;” each sign is divided amongst the Planets. For instance, to Jupiter appertains the first six degrees of Aries, and consequently if he is within the limits of the first six degrees, he is in his own house; if between the sixth and twelfth degrees, in the house of Venus, and so on.

When a Horoscope is to be cast, a square is first described, and divided into twelve compartments as follows:—



The arrangement of the signs in this is intended to shew their position in the case when ♈ rises at the time, for which celestial interpretation is to be made.

In order to the casting of an Annual Horoscope, the following data have to be established.

First.—The master at the time of birth of the changing sign, *e. g.* if Aries rises at that time, the next year at the same hour it will be Taurus, and so on.

Secondly.—The master of the first house for the year.

Thirdly.—The master of Trigrams.

Fourthly.—The master of the sun's house at the beginning of the year, if the year begin during the day, and of that of the moon, if the year begin during the night.

Fifthly.—The master of the first house at the time of birth, if Aries or Scorpio rose at that time; Mars is the ruling planet if Taurus or Libra; Venus, if Gemini or Virgo; Mercury, if Cancer; the Moon, if Leo; the Sun, if Sagittarius or Pisces; Jupiter and Capricornus or Aquarius, if Saturn.

The above observations and computations having been duly made, the advantages and disadvantages, to which every planet is subject, are represented by numbers. The former are then added, and the sum of the latter subtracted from the amount of each. The remainders are now compared, and the planet which has the greatest remainder is the master of the year, and his influence is then paramount.

A similar, but far more complex process, is followed in determining a natal Horoscope; but which, as my object is merely to render

intelligible the inscriptions on the Astrolabe, it were superfluous here to enter into.

I shall now take leave of this part of my subject, with the hope, that a structure so laboured and unsubstantial, so carefully repaired and sustained by selfishness and priestcraft, will at no distant date crumble into dust, when the congenial shade of ignorance, which it now enjoys, shall have been dissipated by the sunshine of knowledge.

Geography.—I shall now describe the geographical and devotional parts of the instrument. The association of these two subjects in one category may at first sight appear singular, but it is none other than what the Astrolabe itself exhibits. I have not deemed it necessary to present a drawing of that part of the instrument exclusively devoted to these subjects, since I feel reluctant to increase the number of the plates beyond what is indispensably requisite; and in the present case, I have hopes of making myself understood by explanation alone.

The bottom of the recess in which the Planispheres repose, is divided by concentric circles, the common centre of which is the reason of the recess into the annuli. The outer of these contains symbols indicating the directions, generally expressed, of Mecca, from the places named in the annulus next below, and correspond with S. E. for South-East, &c. The second contains several of the principal places of Mahomedan veneration and power, beginning, of course, with Mecca. The third and fourth are devoted to the longitudes and latitudes of those places respectively, and the fifth is occupied with the azimuths of the Kaaba at each of them. The remaining annuli are similarly occupied; and thus by this neat arrangement, fifty of the principal Mahomedan cities in Asia, with their absolute and relative positions, are exhibited at one view. It must be confessed, however, that these latitudes and longitudes are, with a few exceptions, under the most favorable view of them, exceedingly inaccurate, and consequently, so are also the azimuths dependent upon them.* Such places as

* The following is their method of deducing the azimuth from the latitude. Having cut off from the meridian, beginning at the zenith, an arc equal to the sum or difference of the latitudes, and from the prime vertical an arc equal to the sum or difference of the longitudes, and from the points of section having drawn perpendiculars to the arcs; the point in which these perpendiculars meet is the zenith of Mecca. Then having drawn chords to the arcs denoting the distances of the zeniths, and those expressing the differences of latitude and longitude, they easily obtained, by Plane Trigonometry, the azimuth angle.

Mecca, Medina, and Ispahan, and a few others, have their latitudes and longitudes pretty correctly assigned; those of inferior note seem to have had them very carelessly observed, or perhaps merely guessed. I must at the same time confess my belief that, generally speaking, European mathematicians have not done their Arabian predecessors full justice, in respect at least to their longitudes; but that having assigned to them a first meridian from which they did not compute, they have unintentionally attributed to them errors that sprung from themselves.

The first meridian among the Greeks passed through the "Fortunate Islands," a meridian which Ptolemy adopted, and from which he made his calculations. These islands have been pretty generally believed to be the Canary Isles, probably from the circumstance of their lying at the Western extremity of Europe. I am rather inclined to think, however, that the place from which Grecian geometers, (and consequently their imitators, the Arabs,) commenced their longitude, was an *imaginary* one, and that therefore, like the *Lanca* of the Hindoos, its position was never satisfactorily ascertained.

The Fortunate Isles probably owed their origin primarily to the fabled *Hesperides*, and, secondarily, to that copious fertility of invention that sprung into existence about the time of Alexander, and which may be traced downwards to that of Columbus himself: an invention which filled up the blanks of unexplored regions with mysterious and delightful lands, untrodden by the foot of ambition, where the golden age still lingered in its bright perfection. Diodorus informs us, that the Tyrant Cassander sent one Gohemerus on an exploratory voyage, and that he discovered the island of Panchaia, astonishing for its wealth, and the innocence of its inhabitants: where the most perfect happiness, peace, justice, and voluntary obedience to the laws, had flourished for thousands of years; this was indeed a fortunate island, and probably the father of our family. Pliny the second informs us, that it was in his day believed by some, that the *Hesperides* still existed somewhere in that direction, but that there was much doubt upon the subject. He also states indeed, giving his authority, that the Fortunate Islands lie under the first meridian. "Juba de Fortunatis ita inquisivit; sub meridiem positas esse prope occasum a Purpurariis dccxxv.m. passuum sic ut ccl supra occasum navigetur: deinde

per CCCLXXV.M. passuum ortus petatur." Without doubt, these were the Canary Islands, but there is no reason to believe that, by any observations of his, the navigator ascertained them to lie under the first meridian; it is rather to be suspected, indeed, that from their being a group, and lying in the supposed direction, he assumed them to be such. Pomponius Mela also attempts to identify the Fortunate Isles with the Canaries, but his description, more minute indeed than that of Pliny, is so tainted with incredibilities, as to convince us of the little reliance that is to be placed on the observations of those who supplied him with information. Some Arabian authors of the twelfth century have got over the difficulty of identification, by asserting, that the "Fortunate Islands" had been, before their time, submerged. However this may be, it may I think be easily shewn, that the first meridian of the ancients could not have passed over any part of the Canary Islands.

In order to ascertain the first meridian, as implied in their computations, I selected some of the principal places, and thus found it to be about $35^{\circ} 50'$ to the west of ours, and thus about nearly 6° beyond the most remote of the Canary Isles.* Bagdad for instance, according to Ulug Beg, in whose authority I have much confidence, lies in 80° E. longitude, while its ascertained longitude is with us $44^{\circ} 30''$, which gives for the first meridian of the Arabs, a position $35^{\circ} 30''$ west of ours, or about 5° to the west of the Canary Islands, and by the whole amount of this difference have the errors of Arabian longitudes been augmented where errors existed, and supposed where they were not. Playfair, for instance, in the introduction to his Geography, while commenting upon their inaccuracies, expresses surprise that they should so far have miscalculated the longitude of the *déboisement* of the Indus, which if he had taken their first meridian in place of the assumed one of the Canary Isles, he would have found it pretty exact.

To our Astrolabe belongs, as already stated, several circular plates of brass, upon which are inscribed stereographic projections of the

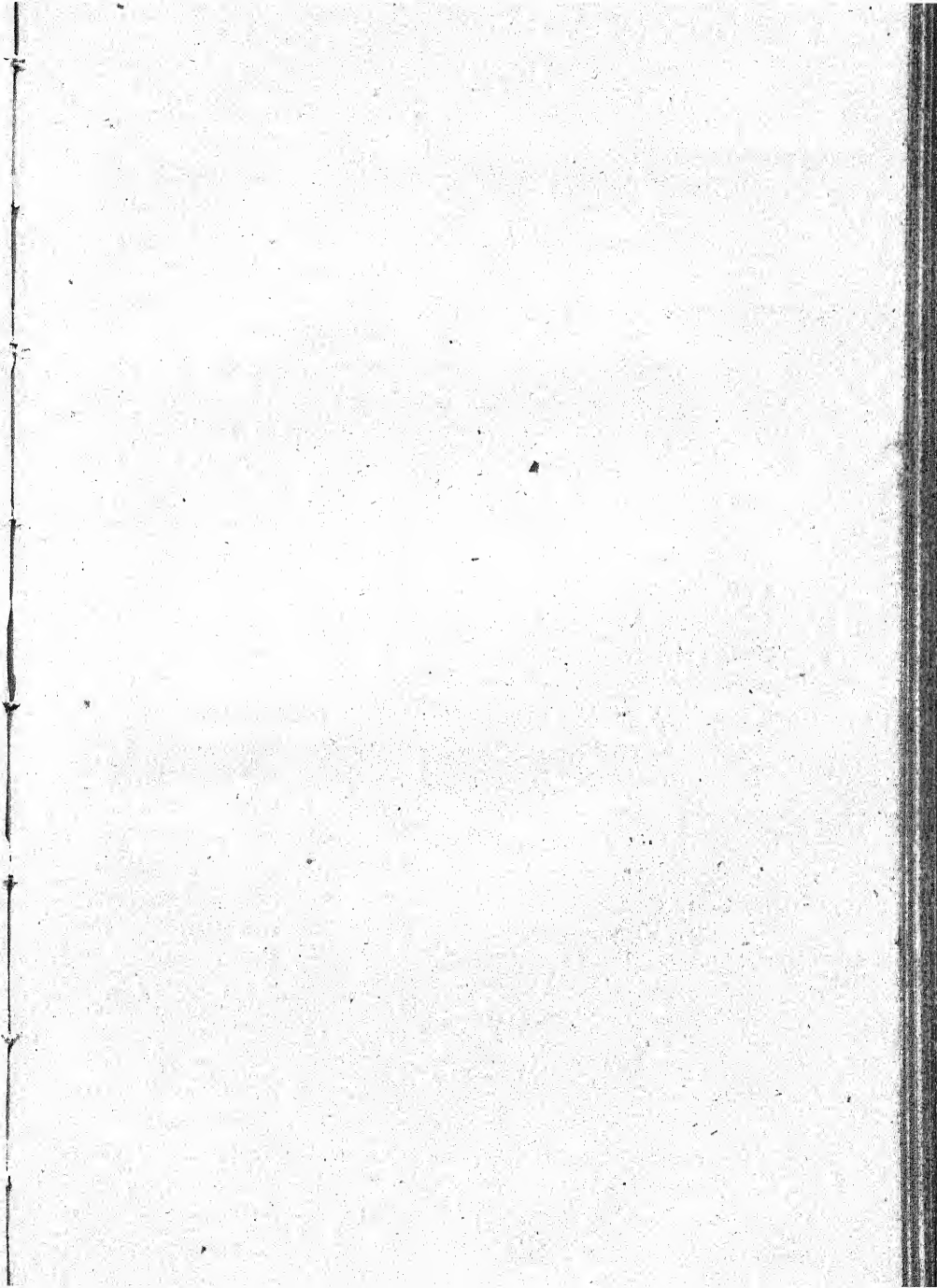
* The following computations confirm this statement:—

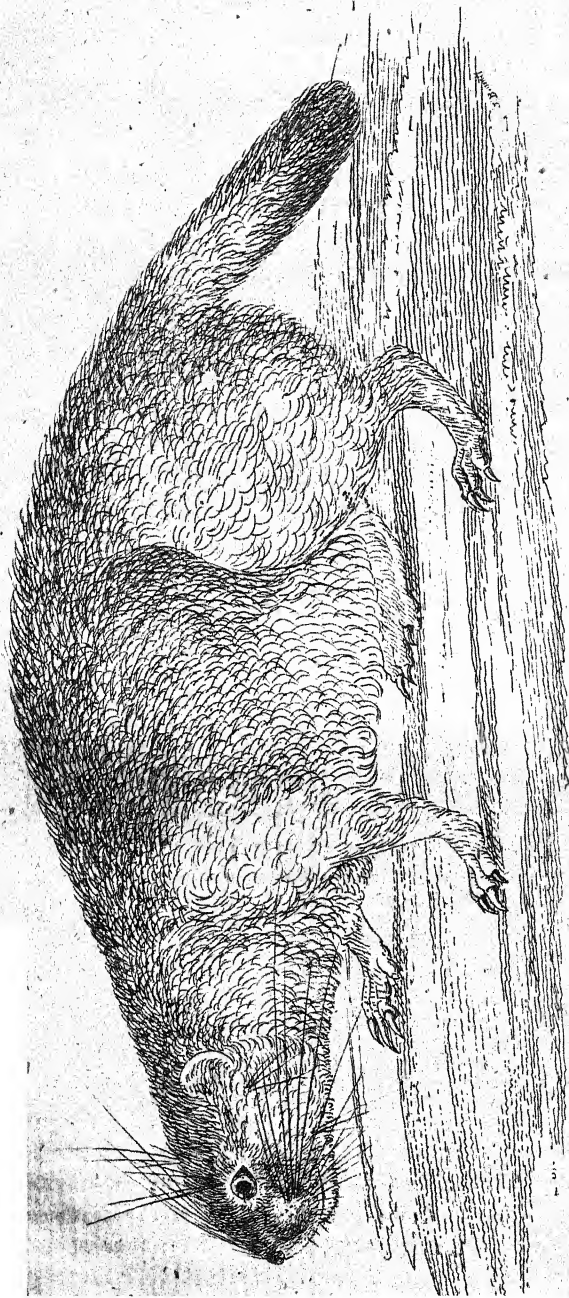
	a. Long.	E. Long.	Diff. of Long.	Average diff.
Medina,	$75^{\circ} 20''$	$39^{\circ} 20''$	36°	
Damascus,	72°	36°	36°	$35^{\circ} 53''$
Ispahan,	$86^{\circ} 40''$	52°	$34^{\circ} 40''$	
Sheraz,	88°	$52^{\circ} 45''$	$35^{\circ} 15''$	
Bussorah,	84°	$46^{\circ} 30''$	$37^{\circ} 30''$	

sphere, according to the latitudes of certain places. Plate III. is a representation of one of these, and only differs from the others in Polar altitude, or otherwise in the distance of the Pole from the assigned limit of vision, which in such projections, is supposed to lie considerably below the horizon : here 24° .

It will be seen from an inscription, at the centre of the plate, that it is characterised not by its latitude alone, but also by a certain measure of time. This was usual among ancient Geometers, who divided, arbitrarily, the earth into a certain number of climates by parallels to the Equator. The limits of these climates were determined, either by their equinoctial distance, or by the length of their longest day, or, as in the case of our Astrolabe, by both. The column of figures rising upwards from the margin of the plate towards the Pole, belongs to the parallels the latitude, of complements of which are numbered, obliquely, from the Equator northward, on both the east and west sides. The figures indicating the degrees of longitude, are arranged both ways from the meridian to the horizon, and are then continued under the Pole on a semi-parallel of latitude. In addition to the meridians and parallels of latitude, are two concentric circles parallel to the horizon, one above, and the other below it : these are almacanthers of altitude. There are also horary circles, with their corresponding numbers, commencing with "first" at the east point, and continuing round the sphere to the same point, also numbers commencing from at the west and ending with 12 at the east, the reading being backwards. These were called by the Arabs direct or reverse hours, for an obvious reason. The latter arrangement of the numbers arises, as I apprehend, from their being conceived to lie on the side of the sphere opposite to that of the former.

By means of the Planisphere, the moveable plate, (Plate II.) already described, and the circles of shadow and of altitude, numerous problems regarding latitude and longitude, time, the altitudes of celestial bodies, &c. are readily performed. Indeed, they serve pretty generally, in these respects, the purposes of our globes, with the great drawback, however, that each Planisphere serves only for its own latitude. Hence it is, that each Astrolabe has usually, in addition to their finished spheres, a model plate; after which others may be constructed. The representation of this is given in Plate IV. It consists of horizontal arcs des-





*Arctomys Himalayanus. Marmot of Nepal and Tibet.
& nat. size. called Shipie and Chupie.*

cribed for the different latitudes marked at their ends, as also the Equator, the Tropics, the Solstitial and Equinoctial colures and indications, in round numbers of the obliquity of the Ecliptic. On some of the Planispheres are drawn, the circles of *sirut* or circles of the direction of the Kaaba; on the one given it is wanting; a few of these appear on the right of the upper limb, Plate I. Fig. *a*. one of which is marked as the line of prayer for Ispahan. The others are similarly marked in the Astrolabe, but I have omitted the names.

In now taking leave of my subject, I have much pleasure in acknowledging my obligation to Rajchunder Dutt, an intelligent Pundit of Calcutta, now, I believe, employed at the Nepaul Residency, for the valuable assistance which he rendered me in decyphering the inscription; as also to Pundit Ruttunlal of this place, who has supplied me with much astrological information.

Agra, September 11th, 1841.

*Notice of the Marmot of the Himalaya and of Tibet. By B. H. Hodgson, Esq.
Resident at the Court of Nepal.*

In the extensive peltry trade carried on between Nepal and Tibet, no skin is more commonly met with than that of the Marmot, which I long ago named in my Catalogue, *Arctomys Himalayanus*, and now beg to furnish a summary description, and correct drawing of.

This animal is from twenty-three to twenty-four inches long from snout to vent, and the tail is usually from five to six more. It is a massive animal, larger than the Indian Hare, with weighty broad head, furnished with large eyes, and small, rounded, but apart, ears.

The neck is short, the body full, the limbs short, and of equal strength fore and aft, though the anterior nails be somewhat stouter than the posterior. The general structure of the feet, is that of the commoner *Murines*, or Rats, and the digits are cleft to their bases, as in the ordinary Rat and Mouse; but the nails are rather stouter, and more suited to digging, though not at all typically scansorial. The tail, one-fourth the length of the animal, is rather slender and cylindric, ending in a bluff point, and not having the hair at all more elongated, or more or less full than it is on the body. The incisors are very powerful, and the molars are as broad on the

crown, as they are high above the gum. Dental formula, incisors $\frac{2}{2}$ molars $\frac{55}{44}$. The distance between the snout and the fore canthus of the eye is greater than that to the base of the ear from the latter; and so broad is the head, that the eyes are $1\frac{1}{8}$ th inch apart in straight measurement. The general colour is a clearly fulvescent catsgrey, much like that of *Felis Chaus*, and fading into pure rufescent yellow below; the limbs and ears the same, but deeper; and the chaffron and end of the tail, dark brown. The fur is close, thick, composed like a cat's, but rather harsher, and of two sorts, or hairy and woolly: the hair, straight, elastic, about $1\frac{1}{2}$ inch of maximum length, and triannulate as to colour from the base, with dusky-brown, rufescent-yellow, and black; the last and apical part being the least; the woolly piles about one inch long, wavy, and void of the black tips; hands, feet, and face, dressed closely in soft hairs only. The following, then, may serve for a specific character, perhaps.

Arctomys Himalayanus, of a rufescent cat-grey colour above, and pure rufous yellow below; the limbs more saturate; the bridge of nose and end of tail, deep brown; the tail equal to $\frac{1}{4}$ of the length of the animal, cylindric and bluff pointed; the fur close, thick, composed of two sorts, and trebly ringed in all the upper parts with dusky, rufescent yellow and black; the wool, without the last ring of the hair; snout to vent 24 inches; tail 6 with hair; head $4\frac{1}{2}$; palm (with the nail) $2\frac{1}{2}$; planta (ditto) $3\frac{1}{2}$.

The habitat of this species is the Himalaya, and Kachar rarely, and very commonly the sandy plains of Tibet; gregarious in large bodies; live in burrows; hibernate for four months; have all the confident tameness of the Bay Bamboo Rat of Nepal, which they greatly resemble in manners; so that the people say of both, that when approached by men, they never think of running away; but put up their fore-feet civilly, deprecating the intrusion, and, if not heeded, resign themselves at once to captivity. The fat of the Marmots is much prized for certain medicinal properties, and is used as an unguent in rheumatism and gout. The cured skins are yet more valued for dress, and form an important article of commerce. Many come to Cathmandoo, and many more go to the towns of China, in the course of trade.

Nepal, June, 1841.

B. H. HODGSON.

Memorandum on the Organization of a Museum of Economic Geology for the North-Western Provinces of British India, to be established at Agra. By Lieut. W. BAIRD SMITH, Bengal Engineers.

The adequate representation and illustration of those important and extensive departments in the economy of life, in which the principles of the science of Geology are made subservient to the interests or comforts of mankind, may with safety be assumed as the chief characteristics of a well-organised Museum of Economic Geology. To insure such results, the resources not of science alone, but of art also are essential; since while the one indicates *when* general principles are applicable to special cases, the other shews *how* they are to be most effectively applied. In devising, therefore, a scheme for the organisation of a new institution of this nature, theory and practice must each have its proper place assigned to it, and each be illustrated by appropriate means. It has been my anxious endeavour to embody these views practically in the following details of the system proposed for the Museum of Economic Geology for the North-Western Provinces of India, and although it may be long ere the institution attains that completeness in its various departments herein specified, it has been considered advisable in projecting it, to do so on the most effective scale. Slow and laborious may be its progress, yet may it be anticipated that by the continual efforts of those interested in its success, even the highest point in the scale proposed, will ultimately be attained.

2. In the investigation of the mineral resources of hitherto unexplored districts, it is of the utmost importance to have a well-defined standard to which the newly discovered products of such regions may with readiness be referred. The basis, therefore, of the Museum in the department of mineralogy, ought, I conceive, to consist of a series of characteristic specimens of all minerals of established economic importance; and if it were possible to procure such specimens from the localities most celebrated for producing them, their value would in some degree be increased. The object of this collection being to impart as great an amount of information as possible, all its arrangements ought to be made subservient to this purpose. The specimens should be carefully

Characteristics of a well-organised Museum of Economic Geology.

Arrangements of the department of Mineralogy.

classified and named, according to an established system of classification and nomenclature, while means ought to be taken to exhibit for each those synonyms by which it is so unhappily burdened. I feel it a matter of considerable difficulty, from the existing state of Mineralogy, both as regards classification and nomenclature, to specify which of the many systems that have, from time to time, been proposed, is likely to prove the most useful. In truth, the many anomalies that disfigure even the most highly recommended of our methods of arrangement, and the excessive and bewildering multiplication of synonyms in mineralogical nomenclature, leave us but the power of selecting the least defective of the schemes that have been proposed; so, that in expressing myself in the present instance in favour of the Natural History system of Professor Mohs, I would add, that I am fully conscious of its deficiencies, and of the anomalous results it not unfrequently exhibits; but on consideration of its general utility, of its extensive adoption as the system of valuable mineralogical works, and of schools of instruction, I am disposed to prefer it to the rival chemical system of the celebrated Berzelius, the only one that can compete with it. Believing, however, that minerals will never be grouped according to the system that actually exists in nature, save by a method of classification that, without being rigidly based either upon their external physical properties alone, as in that of Mohs, or on some arbitrary relation of their chemical constituents, as in that of Berzelius, takes due cognizance of both classes of characteristics, and forms its orders, genera, and species, in accordance with the natural analogies of these, I regret much that I have never seen the system recently proposed by Professor Naumann, of Freyberg, which is based on the preceding mixed principle, and which, in the opinion of Mr. Whewell, himself a Professor of Mineralogy, is the best hitherto published.* Till this system becomes known in India, I would recommend adherence to that of Mohs, in the classification and nomenclature of the mineralogical department of the Museum.

3. While it is essential to the completeness of the Museum that all
 Metallic minerals minerals of established economic ratio should have
 place in it, their high commercial and social im-
 Coals.

* History of Inductive Sciences, vol. iii. p. —

portance give a marked pre-eminence to those of the metallic and carbonaceous orders. Both of these ought, accordingly, to be illustrated to the greatest extent of detail that circumstances will admit of, and specimens of metals, with their various ores, as also of the different species of coal, are of primary importance. The opportunity thus afforded of studying with care those external characters which, by experience, have been recognised as the indices of certain properties in the minerals exhibiting them, may frequently enable us to pronounce an immediate opinion as to the economic importance of newly discovered members of either of the two orders above alluded to. Specimens of each metal when it occurs native, accompanied by others of its native salts and ores, are, I therefore conceive, essential to the illustration of metallic mineralogy, while specimens of all the varieties of coal, both of such as are considered good and bad, are equally essential to that of carbonaceous minerals. As subordinate to the former, specimens of the different matrices, whether of rock, gravel, sand, or clay, in which metallic minerals occur may be provided, while in the same relation to the latter, specimens of the rock, that constitute the coal formation, together with their characteristic fossils, would prove most useful. Some farther remarks relative to the illustration of these two important orders will be made in noticing the mechanical details in Metallurgy and Coal Mining; and I would only add as a reason for adverting specially to them at present, that there is abundant reason to believe, the North-Western Provinces of India afford, both in metal and coal deposits, fields of the richest character. Metallic minerals have long been known, and wrought for commercial purposes throughout them, and indications of extensive coal beds have very recently been discovered in the Himalayas, so situated, as in the estimation of their discoverer, to be of the highest importance to our lately acquired right of navigating the Indus. This, indeed, is but one of many causes that at present combine to give importance to such researches, and to urge upon us, increased activity in their prosecution. The most powerful of all these stimulating causes will probably be found in the execution, in all likelihood at no distant period, of a grand line of internal navigation, connecting the remotest limits of these provinces, with the central mart of Indian commerce, and promising, from the scale on which it has been projected, to admit of such increased

facilities of intercourse, as may be expected to awaken to new life the commercial energies and enterprise of the valuable districts, through which it will pass.

4. Since it may be expected that many of those persons willing to avail themselves of the existence of the Museum to become acquainted with the principles of Economic Geology would require information of the most elementary character, I consider it would add to the useful effect of the Museum, were measures adopted to facilitate the acquisition of such knowledge. As addressing themselves more immediately to our senses, the external characters of minerals first claim attention, and among these, the high importance of crystalline form, arising from its constancy in the same substances, naturally suggests that some measures should be taken for the illustration both of the general principles of Crystallography, and of the manual operations by which these are practically applied to the determination of particular bodies. For the former object, it would I think be found most useful to have a series of model crystalline forms, so arranged, as to exhibit distinctly, those varied, yet determinate modifications of certain primary forms, which are found to exist among crystallised bodies in nature; for the latter purpose, goniometers, or instruments for the measurement of angles of crystals, both of the common compass and reflective kinds, ought to be provided. Those brilliant optical phenomena exhibited by minerals, possessing the property of double refraction, under the influence of polarized light, and which furnish us with new means of referring these minerals to the systems of crystallisation of which they may be members, require for their display an apparatus of the most simple character, consisting only of a few pieces of common glass, and any non-metallic reflecting surface. For the determination of the important property of specific gravity, a hydrostatic balance, or properly constructed hydrometer would be essential, while, a small magnet and electrometer would be necessary for ascertaining the magnetic or electric properties of any mineral under examination. Separation of the most important characters is elicited by the employment of the blow-pipe in the examination of minerals. This therefore, with its necessary accompaniments of fluxes, &c. would be required, and with the addition of a few minor articles, as files, knives, pincers, &c. would

Requisites for the determination of the external characters of Minerals.

complete the list of requisites, for the determination of the external properties of mineral substances.

5. But these physical properties will not in all cases suffice for the iden-

Reason for the attachment of a chemical laboratory to the Museum of Economic Geology, North Western Provinces, and anticipated benefits.

tification, still less for the determination of the economic value of newly discovered minerals; and were we to take cognizance of them alone, we would be led, as Mohs has in many instances been, to class together substances of the most different nature, on account

of their external resemblances. Farther, it has been found, that there exists in nature a class of bodies between which the singular quality subsists, of being competent to replace each other in compound minerals without in the slightest degree affecting the external characters of these. Since the class of isomorphous substances is by no means limited in number, the necessity of having recourse to the definitive test of chemical analysis before deciding on the real nature of any mineral presented to us, becomes apparent. The attachment therefore of a small, but effective chemical laboratory, to a Museum of Economic Geology is, I consider, essential to the efficiency of the institution. Such a laboratory ought to be fitted up with special reference to mineral analysis, and as the apparatus and re-agents required for this are not either very extensive or expensive, the necessary outlay would, I believe, be amply compensated by the results of its operation. It is not merely in the department of mineralogy that its aid would be required; but it will be found, as we advance, that in almost every department of Economic Geology the results of analysis will prove most important,—important not only in an economical, but also in a purely scientific point of view. It is to be remembered that mineralogy is no more limited to the mere identification and classification of minerals than is Astronomy to those of the heavenly bodies, or Botany to those of plants. Like any science it has to do with causes as well as an effect; with laws as well as results, and its true limits will only be attained, when to a clear development of physical properties, it adds the discovery of those principles of internal organisation of which these properties are only the visible exponents. An element of the first importance towards such discoveries, is a thorough acquaintance with the chemical components of mineral substances, so that viewed only as a boon to pure science, the application of analysis

to the mineral products of the North-Western Provinces would be of the highest order ; and the field is so novel and extensive, that we could scarcely fail to develop information at once valuable and interesting.

6. From the experience already obtained in the prosecution of mining operations in this country, it appears that one main obstacle to their success has arisen from defective knowledge of the practical and working details of such operations. In the arrangements of the practical department of the Museum, our efforts ought accordingly to be directed to the removal of this deficiency, and measures ought to be adopted for procuring, from the best sources, the means of illustration required. Primarily, in the case of metallic minerals, specimens of the ores of each metal, in the different stages of their progress, from their original extraction from the matrix to their production in a state fit for commercial or general purposes, ought to be procured, and arranged systematically with every reference to instruction. For the illustration of each process, wherein apparatus or machinery is employed, models of these ought, whenever practicable to be procured, and on such a scale, as to admit of the exhibition of details of construction. Farther, similar models exhibiting the underground arrangements of the mine, the means of ventilation, whether by shafts or machines, of keeping the mines free from water, of conveying and raising to the surface the rough material, and generally such other practical details as it may be possible to represent in this manner, would prove most useful. It would, I conceive, be perfectly practicable for a person familiar with the subject, and with modelling, to represent in a single model, the entire series of details now adverted to, and although such a model might prove expensive, yet since the information to be derived from it, would be in every respect of more practical benefit than that afforded by drawings, or oral or written descriptions, I do not think a complete Museum of Economic Geology ought to be without something of the kind. Models of the most approved forms of miner's tools would also be most useful ; and since blasting with gunpowder is constantly had recourse to in all extensive mining operations, the series of tools necessary for that purpose may be annexed. Arrangements of a nature similar to those just detailed,

Means of illustrating processes of Metallurgy and practical details of Coal Mining.

would be necessary to the illustration of practical coal mining. In reference to this branch of the subject, it may be remarked, that the strongest evidence of the necessity of taking effective measures to extend an acquaintance with the practical details of coal working, may be found in nearly every page of the valuable and interesting report of the Coal Committee, and from these documents, the most authentic as well as extensive records we possess of Indian mining operations it may be learnt, that to deficiency in this respect, combined with neglect of proper investigation of the fields themselves, the feeble success of our coal mines is chiefly to be traced. With new fields opening to us in the North-Western Provinces, it becomes us to follow another course, and by taking measures to disseminate practical information, and also by careful examinations of the deposits that may be discovered, to guarantee, as far as we can, its legitimate return to invested capital, and to enterprize its merited reward. The survey of a newly discovered coal field being conducted either by the sinking of shafts, or as is in every respect superior, by the employment of the method of boring, it is advisable to represent the tools and working apparatus required for the latter operation in model, as part of the illustrations of the department under notice. There would be the less difficulty in doing this, since the whole series is in this country, and unless recently removed, is, I believe, lodged in the arsenal of Fort William. In a former paragraph, the propriety of having a complete suite of characteristic specimens of the varieties of coal was alluded to, and these, combined with the series of illustrative models, would afford a most useful study to individuals desirous, either of prosecuting or directing coal-working operations. There are certain subordinate points, as for example, the kinds of furnaces best calculated for the different varieties of coal, the uses to which inferior descriptions of the mineral, as those highly impregnated with pyrites, may be put, &c. &c. on which information may be conveyed with advantage. Time must elapse ere the Museum for the North-Western Provinces could be complete in the practical departments now being noticed; but in a few years, provided its objects are energetically pursued, it may be expected to become an institution of the highest utility to this part of the country, and will I have no doubt, realise the expectations that have been formed of it, both in regard to its economic and scientific importance.

7. The next department of the Museum, on the arrangements of which I would make a few remarks, is that of Architecture and Civil Engineering; in which are included the various applications of the rocks composing the earth's crust, to the purposes of common or hydraulic architecture; of road-making, in the formation of mortars or of cements. Since each of the great systems or series of rocks, formed the distinct epochs that have been recognised by geologists furnish materials adapted to some of the preceding objects, it would be well to place in the Museum, a suite of characteristic specimens of the individual rocks composing these systems, arranged according to that order of superposition, which has been found to prevail among them in nature. It is, however, to be remarked, that those lithological characters of rocks, on which their applicability to the purposes of the architect and engineer is dependent, vary so much in different localities, that although a particular rock may, in one country, be admirably adapted to such purposes, it by no means follows, that its equivalent in another, must be equally so. Hence, although it would be useful in aiding research, to have in the Museum such a collection of specimens as I have above averted to, yet in this department our chief object should be to procure, with the least possible delay, a collection of native, not exotic rocks. It is by the investigation of the physical and chemical properties of the former, that information available for practical purposes in this country, is to be procured; and although comparison of these results with others obtained elsewhere would, of course, be interesting, and in time might be instituted, it is I consider, of secondary importance. Specimens, therefore, of all natural products, employed in the department of Public Works, whether as building materials, road materials, or materials for making mortars and cements, ought to be procured for the Museum, and their properties experimentally investigated.

Considering the extent to which Public Works are now carried on, and the number of intelligent individuals employed upon them, it cannot be doubted that a large amount of information, specially relating to the department of Economic Geology under notice, exists in the community; and were the Museum established, it would prove the means of concentrating this for general bene-

fit and use. In process of time, when specimens and information had accumulated to such an extent, that the resources of the different districts whence they had been procured were duly represented by them, it would be practicable to construct a map of these Provinces, from which would be gathered at once, the extent of means available for Public Works in any given localities, and much aid afforded to officers deputed to conduct such works, to whom the districts might be unknown. Beyond the simple facts of rocks having been extensively used as materials for different purposes in our Public Works, and having in several instances been found most useful, we possess no farther information regarding them. No definite details of their physical or chemical properties, of their power of cohesion, adhesion or absorption; of their mineral characters, geological relations or component, parts have ever been furnished, and till we know something of these, we can form but very indefinite estimates of the real economic value of any materials we may have at command. To accumulate information on the points just mentioned, and to encourage farther investigation, so that the sites of new materials may be discovered, will be regarded as objects of higher moment, when it is borne in mind, how intimately the agriculture, and consequently the revenue of these provinces is dependant on the facilities, with which works for the purpose of irrigation can be executed, and how extensively the materials alluded to, are employed in the execution of these works. In like manner, the interests of trade afford a motive for encouraging investigations, relative to the materials for the construction of roads, so that viewed generally, the prosperity of the country is intimately connected with the effective illustration of this department of the Museum. The properties possessed by sandstones, limestones, or dolomites, fit them best for the purposes of building, and those possessed by rocks of igneous origin, as trap, or basalt, for road-making; hence both classes become of economic importance, and ought to have place in the Museum. For the illustration of the mortars and cement, specimens of the materials employed in their formation, from the pure limestone, to the impure argillaceous kunker, together with models of the best forms of kilns for burning, and of mills for crushing, ought to be provided, and would, I think, complete this department of the Museum.

8. The importance of the department of agriculture in the Economic Geology of the North-Western Provinces is so great, that we can scarcely be too anxious to insure its effective illustration and development. Under it may be included investigations of the geological relations, the chemical composition, and the capabilities of different soils, of the influence exerted upon these by waters of irrigation, natural and artificial, and of the nature and effects of the application of varieties of mineral manure. To illustrate the geological relations of the soils of these provinces, specimens of the rocks that may be found to underlie them, and from which their mineral constituents may have been derived, ought to be procured for the Museum. There are of course many localities, as the great alluvial districts, and the valleys of the great rivers of India, the soils of which can be referred to no particular derivative rocks, but which have been derived from many sources, yet where such rocks do occur, a most intimate relation necessarily subsists between them and the soils to which their disintegration, by natural causes, has given origin. It is this relation which gives so much of their value to the geological maps of districts, and render them of so much utility to the scientific agriculturist. From those localities, therefore, in which particular kinds of soils may be observed, specimens of the soil itself, of the underlying rock or stratum, and also of the sub-soil, or portion intervening between the soil and rock, and exhibiting the gradual transition from the one to the other, ought to be forwarded to the Museum, and there systematically arranged. As in the previous department of Architecture and Civil Engineering, so in this, materials would so accumulate in process of time, as to make it possible to construct a map, exhibiting the distribution of soils in the North-Western Provinces, a work at once interesting and useful. Since the staple vegetable products of this country are common to it, and to many distant parts of the earth's surface, it would be of the highest interest and importance, to be enabled to compare the soils sustaining them here, with those from which they may there be produced. Hence these specimens of such soils from tracts producing articles similar to our own, ought to be obtained to as great an extent as may be practicable. The analysis of these might be expected to yield us information as to the peculiar principles on which their adaptation to

particular products was dependent, and might suggest experimental inquiries as to the improvements of our native soils, the results of which could scarcely fail to influence beneficially the general interests of the country. It is to be remarked, that as certain portions of a soil are withdrawn from it for the sustenance of the products reared upon it, so its analysis, to afford the most useful results, ought, I conceive, to be made both before the seed was sown, and after the harvest had been reaped. The results of simple analysis, however, although most important, are by no means the sole requisites for enabling us to compare soils, the fertility and adaptations of these being the effects of many conjoint causes; as the physical aspect, the atmospheric relations of temperature, moisture, exposure of the districts from which they may be obtained, and also the nature of the deposits from, or the chemical constituents of, the waters employed to irrigate them. In illustration of this last mentioned point, it would I think be advisable, that specimens of soils from districts in the North-Western Provinces should be accompanied by others of the waters of irrigation, whether derived from springs, rivers, wells, tanks, or artificial canals and water-courses. An experimental investigation of them, both as regards the matter held in simple mechanical suspension, or in chemical solution by them, would always furnish us with most interesting information, and in some instances, might enable us to detect the source either of the peculiar fertility or sterility of the soils in certain localities. Specimens of the various kinds of mineral manures employed in this country, and also in other countries, from which it may be possible to procure them, together with those of soils to which they may have been applied with success, would complete, I think, the illustrations of this department of the Museum; and on being subjected to the same process of analysis as in the preceding instances, might be expected to add, in an important measure, to the information previously collected. It will be observed how essential the aid of the chemical laboratory recommended in a former paragraph, is to the effective illustration of this department, since without it, those researches which promise to cast light upon the principles by which the practical operations of agriculture are influenced could never be undertaken; nor could we ever expect to replace the empirical rules, by which agriculturists are now guided, and often guided wrong, by general laws induced from

carefully observed phenomena, the only sure foundation on which the philosophy of agriculture can be reared.

9. Since the earths, alumina and silica, constitute the basis of all descriptions of Pottery, from the common earthen-ware vessel to the Porcelain vase, the rough materials for such manufactures will be found wherever silicious and aluminous rocks prevail. These

Managements of
the department of
Pottery and Glass
Manufactures.

are by far the most extensively diffused in nature, and there are indeed but few rocks into which the earths above mentioned do not enter in greater or less proportions. From the circumstance, however, that the simple minerals composing rocks of the granitic and felspathic classes furnish silica and alumina, both in greater abundance and more purity than usual, it is from them that materials are most frequently procured for the higher descriptions of Pottery, as Porcelain and China-ware. Thus, the celebrated Kaolin, or Porcelain earth of the Chinese, is simply a result of the disintegration of granitic rocks, and has been found abundantly in Southern India, where these largely prevail, while for the use of the Staffordshire Potteries, immense quantities of Scotch and Welsh granites and feldspars are imported. From the geographical extent of the North-Western Provinces, it may be expected, that rocks of the classes above adverted to, will be found in many localities, and from these specimens of the rocks themselves, and of the result of their disintegration ought to be forwarded to the Museum, where an investigation of their properties would be made. But it is not to the mere exhibition of the materials best adapted for manufactures in the different varieties of Pottery, or to the diffusion of information relative to these alone, that this department of the Museum ought to be confined. If we desire to raise the standard of our Indian Pottery manufactures, we must endeavour not only to supply good materials and improved processes of manipulation, but also to correct and elevate the *taste*, by which the use of these is to be regulated. To effect these objects, measures ought to be taken to procure for the illustration of this department, specimens from our English Potteries, exhibiting each successive process in the formation of articles in Porcelain or Stone-ware, from the first appearance of the rough material, to its production in a state fit for use or ornament. Accompanying these, should it be practicable to obtain them, ought to be model representa-

tions of the apparatus or machinery employed in preparing the material in any of the processes alluded to. Examples-also of the varieties of manufacture, selected with the view of their being presented to native workmen as models for imitation, ought also, I conceive, to be procured for this department; in the higher and ornamental descriptions of Pottery such specimens ought, of course, to be chosen as may be distinguished for beauty of design, both in relation to form and embellishment, so that the purest models may be presented for study, and some perception of the truly chaste and beautiful infused, if possible, into the native mind. I would only add on this subject, that the specimens of Indian Pottery exhibited in the decorations of native temples and palaces, display such an extent of knowledge in the simple process of manufacture, and in the nature and methods of applying colouring materials, as to encourage the belief, that were the standard of taste corrected and refined, this improvement would be rapid and important. A series of illustrations of our manufactures in Glass, similar to that recommended for those in Pottery, might be expected to call attention to a department of industry, for which the requisite materials exist in abundance in these Provinces; but which I believe has hitherto been followed only to a most limited extent.

10. Intimately associated with the preceding, as furnishing to the Porcelain painter or Glass stainer, the materials required for the completion of his designs, is the department of Mineral Pigments. This however is

by no means limited to manufactures, it extends also to the arts, and to the more common applications of painting, for both of which it furnishes some of the most important colours required. It is only necessary at present to refer, as examples, to the chromates of iron and lead, the various ores of cobalt and manganese, in Porcelain painting, and different departments in glass manufacture; to the pure and impure bi-sulphurets of mercury or vermilion and cinnabar; to the arseniates of sulphur, or red and yellow orpiment, in the arts; and to the sulphate, blue and green carbonates of copper, the colcothar or oxide of iron, sulphate of zinc, in the more common varieties of painting. There is farther, a large class of colouring materials derived from combinations of the foregoing, and others in various proportions, as smalt, from the mixture of the ores of cobalt with silica and potassa,

Arrangements of
the department of
Mineral Pigments
and Dyes.

red, yellow, and green colours from that of the chromate of iron with oxides of other metals. For the illustration of the department of mineral pigments, specimens, therefore, of the various simple pigments, found in nature, and the compound ones formed by art, ought to be procured. When attention has been attracted to this branch of the subject, we may anticipate the development of information relative to native colouring materials and modes of applying them, that could not fail to prove both interesting and useful. With the department under notice, I have associated that of mineral dyes, because many minerals included in the one, belong also to the other. A similar series of illustrations would be requisite for the dyes as for the pigments, and similar results might be anticipated from their investigation as employed in native manufactures.

11. Under this department of the Economic Geology of a country, Department of Mineral Springs. are included the different kinds of mineral springs or waters that may be found in it. These are important, not only as holding in suspension or combination certain mineral products applicable to economical purposes, but also in their scientific relations, and especially in their connection with the geological structure of the district in which they may be found. The occurrence of mineral springs is almost invariably characteristic of the action of disturbing forces, and it is in those districts, where such forces have been most active, that they are found in the greatest abundance. When they are thermal as well as mineral, their interest in a scientific point of view, is much increased; and I may remark, it would be an important contribution to the materials already collected for the investigation of the subject of interior terrestrial temperature, were the thermal conditions of such springs of this class as either have been, or may, yet be discovered in India, investigated with care, and in detail. In the department under notice, are also included those springs of petroleum, naphtha, or the impurer bituminous products which have already been found in several parts of India, and which we may hope to find in the North-Western Provinces also, when the Himalayan coal fields have been more thoroughly examined. Specimens of all mineral springs, whether bituminous, chalybeate, sulphureous, alkaline, saline, or acidulous, that may be discovered in these provinces, ought to be forwarded to the Museum, where they would be examined, and their economic value ascertained.

12. It is unnecessary for me to do more than simply to allude to the department of Mineral Medicines. It has, I believe, in common with the other branches of the *Materia Medica* of India, been carefully investigated by a Government Committee, and it may therefore be concluded, that little difficulty will be found in obtaining such information, as may enable us to illustrate, by specimens, the resources of the North-Western Provinces in this useful and interesting department of the Museum.

13. There are other instances besides those to which specific allusion has now been made, in which geological principles or mineral substances, are made subservient to economical purposes; as an example of the former, the theory and practice of the Artesian method of well-sinking may be mentioned, and of the latter, certain processes in metallic manufactures, in soap-making, bleaching, &c. I am unwilling, however, to extend this memorandum by any details relating to these, since with the exception of the first mentioned, they are of minor importance. The method of boring employed in sinking Artesian wells, has already been adverted to in a former paragraph, and measures for its illustration therein recommended. I would now, therefore, only recapitulate here the several departments with which the measure has been subdivided, and conclude with a few remarks on certain collateral measures to be adopted, for increasing the utility of the institutions. The departments are—

1. Mineralogy,
2. Architecture and Civil Engineering,
3. Agriculture,
4. Pottery and Glass Manufactures,
5. Mineral Pigments and Dyes,
6. Mineral Springs,
7. Mineral Medicines,
8. Miscellaneous.

14. In order to furnish specific information to those persons, who may be willing to forward the objects of the Museum, relative to the points to which their attention ought to be directed, it is proposed to circulate extensively tabular forms, or when more appropriate, lists of queries, exhibiting the *desiderata* in each of the preceding departments. Some progress had been made in the preparation of these,

when sudden illness interrupted it. I trust, however, ere long, to be able to submit the series for the consideration of the Asiatic Society. The information obtained by the means above alluded to, ought to be embodied in the periodical reports of the Curator of the Museum, and made public, either directly, or through the medium of the Journal of the Asiatic Society, as may be thought most advisable. It is possible that the Society may be able to render farther aid to the Museum, by transferring to it, duplicate specimens of minerals, rocks, &c. or otherwise to give it such assistance as an institution, which if established at all, will be so by its recommendation, and in immediate connection with it, may be considered entitled to. Those means of illustration in several of the departments, which it will be necessary to procure from England, may, I presume, be obtained through the influence of the Court of Directors, which, by the establishment of the Museum of Economic Geology in Calcutta, has given the strongest proof of the interest felt by it in the subject, and of its willingness to aid practically, its development in this country. By the Curator of the Museum placing himself in communication with learned societies in other countries, much interesting information relative to the economical applications of their mineral products might be obtained, and rendered available for useful purposes here.

15. It only remains for me to add, in conclusion, that from the circumstances under which this memorandum has been prepared, I fear that some points of importance may have escaped notice entirely, and that others may have been imperfectly discussed. Such defects will, however, be rectified by those, under whose consideration these remarks will come, and I will most gladly avail myself of their wider experience, and more extensive information, to correct or extend the views herein expressed.

6th September, 1841.

*On a new Organ in the Genus Moschus. By B. H. HODGSON, Esq.
Resident at the Court of Nepal.*

That accomplished naturalist, Mr. Gray, gave, five years ago, in the Zoological Journal, some observations on the Genus *Moschus* of Linn. in the course of which, after remarking that the great Swede's genus was characterised by himself merely by the absence of horns, Mr. Gray suggested some further marks of distinction for the genus. Mr. Gray divided the genus into three subgenera, and discriminates the Musks proper by their coarse pelage, their simple and clad metatarsus, their throats undenuded of hair, and the peculiar pouch in which the musky secretion is found.

Without staying at present to remark upon these diagnostics, it will readily be allowed, that most of them are not so important, but the addition of another decided and organic one must be hailed with satisfaction; and I therefore proceed summarily to describe, what the pencil of my painter has made the description of almost superfluous by the accompanying drawings. The very short tail of the proper Musks has often been remarked on; but it has not been, so far as I am aware, noticed, that this short tail is the seat of a secreting apparatus as marked and peculiar in character, as the celebrated preputial pouch. The tail is rather more than an inch long, and nearly as wide at its base as long, trigonal, depressed, and nude, especially on the upper surface, far *below* it is (like the proximate margin of anus,) partially covered with soft hair. At the very apex, there is a tuft of hair as harsh and quill-like as that of the body generally! and this tuft only is seen in the living animal, the rest of the tail being hid by the hair of the rump. Raise that hair, however, and you at once perceive the real tail, flat-looking, nude, thick, and greasy, whilst around it the hairs are glued together with a viscid liquor, which has become more or less dried and candied here and there. Look closer, and you discern that the whole tail, especially on its superior surface, consists in fact of a hard solid gland, about three-eighths to half an inch thick, which secretes the viscid humour in question, and gives it off slowly, but without intermission, by means of two lateral pores. These pores consist of longitudinal folds of the skin, about as deep as the thickness of the gland, and about three-quarters of an inch long. They are narrowly elliptical in form, possessing thick,

the general character, the suborbital pits of the *Rusa* Deer, when periodically excited, or yet more nearly, the frontal pits of the *Muntjac* under similar excitement; and, lastly, these caudal pores have a basal and marginal position, one on each side of the tail. If you press hard on the gland, the secretion is protruded through the pores in a thick state, like vermicelli; but it ordinarily passes off by the pores in a more liquid state like melted honey, becoming hard and candied as it dries on the edges of the pores. It seems always to be secreted and always to pass slowly off. It has a strong, peculiar, and rather offensive odour, not at all musky; and by its abundance, and the regular apparatus for its formation and discharge, must be of high, though I know not of what, importance to the animal. I noticed it first a year ago, and have since examined it in two other specimens, one live, and the other just dead. The first subject was submitted to Dr. Christie's inspection, who can confirm all that I have stated. My *fresh* specimens of these animals are of the more ordinary and uniformly dark species, called by me, *Saturatus*. But, so far as a judgment may be safely formed from dried skins, the other species, or *Chrysogaster* and *Leucogaster*, possess a similar organ, which therefore would appear to belong to the whole of the Musks Proper. These animals, I may add, are further distinguished by the absence, not only of suborbital and inguinal, but also of interdigital pores, and by hoofs and false hoofs, as long and pointed almost as spikes; not to mention that remarkable pouch, in which the musky substance itself is collected, and of which, as more talked of than understood, I subjoin a sketch, in addition to the ones exclusively dedicated to the illustration of the caudal gland and pores.

B. H. HODGSON.

Nepal, July, 1841.

P.S.—Should this paper fall under the eye of Mr. Ogilvy, I beg to let that gentleman know, that when I published my description of the three species of *Moschus* to which he adverts, I had been long familiar with the ordinary effects of nonage upon the colour of the common species of this genus, of whose parturition and gestation I had, years previously, given a particular account in print.* Mr. Ogilvy's scepticism, therefore, is not better founded in this instance, than in some others, as he must pardon me for saying.

Extracts from a Report on subjects connected with Afghanistan. By
 DR. GRIFFITHS, *communicated to the Editor, from the office of the*
Political Secretariat of India.

Forests.—The nearest wooded part of the Sufaid Koh to Cabul is Taizeen, a distance of three marches, including, at least by the common route, a steep pass, the Huft Kothal, some 3,000 feet in height. In the direction of Cabul, there does not appear to be any water-carriage available for the transport of the timber of the Sufaid Koh. Cabul may therefore be said to be in a considerable measure beyond the reach of an efficient supply of good and durable timber.

Candahar and Ghuzni may be said to be absolutely beyond the reach of any indigenous supply, no forests occurring within any practicable, if within any distance. The forests of the Sufaid Koh consist of various kinds of Fir, among which the Deodar is abundant; the Cheel or *Pinus longifolia* also I believe occurs, as well as the Chilghozeh, which from the abundance of the seeds, sold or exposed for sale, must be common. The seeds of this appear to resemble exactly the seeds of the Kunawur *Pinus Gerardiana*; it will be interesting to ascertain whether the trees are identical; if so, it will not be the only instance of affinity between the Floras of the two countries. These forests likewise contain the Baloot, a species of Oak; the Zaitoon, a species of Olive; the Sehnee, and two or three others. I am not personally acquainted with the trees of this range. Captain Burn, commanding the Khybur rangers, one of the few who had ascended the lower ranges, informed me, that the Baloot and long-leaved Fir were common. The chief tree on the Taizeen ridges is the Deodar. It is very unfortunate, that from this great range, there does not appear to be available water-carriage in any direction, at least to the northward. The only forests, with which I am tolerably acquainted, are those about Olipore, in which direction the mountains, as I have more than once observed, assume the Himalayan features. The principal trees of these mountains, always excepting the neighbouring ones of Kafiristan, are the Deodar or Nokhtur, the Zaitoon, and the Baloot. There is perhaps another species of Oak, but, so far as I know, there is no other Fir tree. The distribution of the forests may be stated as follows: the Baloot ranges from the bed of the river to an elevation of 2,000 feet above it, or 4,500 feet above the sea. It commences to be mixed with Zaitoon towards its upper limits; and is

soon supplanted by it, the Zaitoon forming the chief, if not the only part of the forests, as far as the lower limit of the Deodar, at an elevation of 6,500 feet above the sea.

Between this and the summits of the ridges which attain a height of about 10,000 feet, the Deodar rules supremely vast in abundance and in size. These forests may be considered as available for Jilalabad and Peshawur.

As the valley of Olipore is very narrow, and the lowest, which is a considerable one, sweeps in many places under the Oak forests along its right bank; this timber could be supplied effectually.

The tree, however, does not reach any size near its lower limit of distribution. Greater labour, and a proportionally greater expense would be required to supply the two others in proportion to their distribution.

There is perhaps but little prospect of the country about Jilalabad arriving at much importance. A small supply of timber may be demanded by Europeans, but Jilalabad, from its extreme heat, can scarcely become their residence except for the winter months.

The forests of Olipore are therefore of comparatively little use, and will probably remain so, until Peshawur assumes its real importance. The want of timber about Candahar, though not, if I recollect rightly, in the city itself, is remedied by the construction of the houses, which are generally domed. The houses of Cabul are extremely slight, built of mud and small timbers; these are supplied exclusively almost by the Poplars, which are planted in many places along the banks of the Logor and Cabul rivers, by which they are carried towards the city during the floods. This timber is white, and very soft; it does not enjoy fair chances, for the trees are planted so close together, that they not unfrequently grow together, and they are cut prematurely.

They are quite unfit for building purposes, and some idea may be formed of their perishableness, when it is said that Cabul is renewed once in every 25 years.

I have already mentioned that the great majority of the cultivated

The only other trees besides the fruit trees known to me, are three or four kinds of Poplar, three or four of Willows, and the Hawthorn. In Baben's garden, there are many very fine Poplars.

trees are fruit trees; these are for many reasons not available for the purposes of timber.

The great bulk of the vegetable fuel is supplied by the low bushes, chiefly species of *Artemisia*, that occur commonly in the barren parts of the

country. They are not good fuel, except perhaps for particular purposes, having no bulk, and burning very rapidly. They are, I believe, chiefly used by the bakers, and the loads, carried generally on asses, constitute not one of the least nuisances of the crowded and confined streets of Cabul. From Taizeen supplies of Baloot branches are brought to Cabul, as well as a good deal of charcoal prepared from it and the Deodar. But the price is enormous. I have heard officers say, that the daily expense for fuel, during the severity of winter, was not unfrequently three rupees.

Nevertheless, the experiment might be tried with some of the indigenous trees, on the better parts of these same slopes. Attention should, I think, be chiefly directed to the Baloot, which is the only tree that has striven to establish itself on the barrenness of an Affghan mountain. The Zaitoon and Deodars of Olipore cease abruptly, the Baloot struggles on from Koonur to Taizeen.

The growth of the timber trees now cultivated should be discouraged as much as possible, as soon as efficient European timber trees have been introduced. This may be a matter of time, but scarcely of difficulty, considering the state of perfection the overland interchanges of seeds between Drs. Royle and Falconer. I have appended to the report a list of the various desiderata.

In all the lower parts of the country the best of the timber trees of the dry plains of the N. W. might be introduced. In such parts as about the Koonur valley, the Sissoo is occasionally met with; to it the Seriss, Jamun, Kikhur, &c. might advantageously be added. Around each of the main places in the country, small plantations might advantageously be made, particularly of such timber trees as are best adapted for the purposes of military arsenals. Thus at Jilalabad and Candahar, the Sissoo might be planted with reasonable prospects of success; for the supply of Cabul and Ghuzni we must look to Europe and the Himalayahs. At present I know, it is next to impossible to repair or construct properly a gun-carriage; the Plane tree is the only available one, and besides not possessing even ordinary merit, is procurable with difficulty. I cannot offer any particular suggestion towards supplying Candahar with fuel; with regard to Cabul, I may be allowed to suggest a comprehensive survey of the Taizeen forests, and of the other wooded portions of the Sufaid Koh in that direction; particular

respect being paid to their communications with Cabul. At present the line of road for any beast of burden, but a mule or a donkey, is very circuitous and arduous. The dealers in wood and charcoal, however, instead of turning the range which forms the south boundary of the valley of Cabul itself, cross it near the place where the large Bactrian pillar, now called Baber's Pillar is situated; by this they *debouche* immediately into the valley of Kooro Cabul, saving a circuit of several miles, and preferring shortness and great steepness, to length and comparative levelness. A new line might possibly be marked out. The grand remedy will be found when good and accessible coal shall have been discovered; this is one of the greatest desiderata, and search for it should be proportionally encouraged.

Affghanistan is a country of mountains intersected by vallies, or as Physical features
of Afghanistan. some may perhaps be called, steppes. It appears to me to possess many peculiarities, and my limited experience cannot suggest a country, with which it may fairly be compared. A popular general idea of it may be formed by imagining, the upheaving of an extensive and varied system of mountains, through an enormous plain variously covered with boulders and shingle, and presenting here and there deposits of soil, generally in the shape of narrow strips along the principal lines of drainage. The general form of the country as now limited, may be compared to that of an equilateral triangle. Its boundaries are undoubtedly the Indus along the Southern line; the Koh-i-Baba, Paropamisus, and Hindoo Koosh along the North-Eastern; Persia, Seistan, and the territories of Khilat along the Western.

Of the above-mentioned boundaries, those of the North-Eastern and Southern or South-Eastern sides are natural in the strict sense of the term; those on the Western sides are badly supplied by the changeable and arbitrary boundaries of Beloochistan and Persia.

The mountains may, I think, be said to belong to two great systems, Mountains. that of the Hindoo Koosh, Koh-i-Baba, and Paropamisus, which appear to be nothing but different parts of the westerly continuation of the great Himalayan chain, and the Sufaid Koh. This is, however, connected with certain of the extreme southerly offsets of the end of the Himalayas, or beginning of the Hindoo Koosh. To one or the other of these systems all the subor-

dinate ranges may, I think, be traced: although I have no personal acquaintance with the countries between Candahar and Ghuzni, and the Southerly prolongation of the Sufaid Koh. The true mountain, Hindoo Koosh, for this name has been laxly applied to the whole See Burnes' Travels. range, is situated nearly due north of Cabul. I have no personal acquaintance with it. The higher peaks of this chain always present traces of snow, and are visible from some points about Cabul. I am not acquainted with the exact point in which the Himalayas assume the name of the Hindoo Koosh; but I have grounds for believing, that the features of the Himalayas are not changed at Olipore, Lat. $34^{\circ} 54' 38''$ N. Long. $70^{\circ} 12'$ E. The Kohi Baba is a direct continuation of the Hindoo Koosh, from which it appears to be separated at first by the Kaloo torrent, and then by the united Kaloo torrent and Bamean river. On either side of these lines, which appear to be the deepest lines of separation, numerous and very varied offsets from both ranges occur. It is over these intermediate portions, that the best routes to Bamean pass, the highest point traversed, is the Erak pass, which reaches an altitude of 13,000 feet. But the best route, one which is said to be more easily practicable for artillery, and open throughout the year, is through the country of the Shaikh Ali Huzaras, this probably does not pass over ground exceeding 9,000 feet in altitude.

The eastern end of the Koh-i-Baba, or its commencement, is certainly grand; a magnificent view of its three snow-clad peaks is enjoyed from a pass between Yomurt and the Helmund river. Its extreme eastern part shews itself in the form of a vast rounded mass on approaching it up the Siah Sing torrent; but to the west, it rapidly assumes a different appearance, presenting a succession of lofty peaks, as far as the eye can reach. In this direction it loses itself, and I believe becomes diminished in the Paropamisus. Snow exists on its eastern portion throughout the year; in sheltered places it occurs in beds of considerable size.

In August 1840, I ascended this range near Kilah-i-Kaloo, up to 13,500 feet. No change in the usual features occurred, but from that altitude the ascent became much steeper, and was rendered much more difficult by the ruins of enormous slips.

With all my endeavours I was only able to reach the general level of the connections of the peaks; these were completely inaccessible,

the nearest did not appear to be more than 1,000 or 1,500 feet higher than the spot on which I stood. Patches of snow commenced about sheltered situations at 13,500 feet, and towards the summit beds occurred, except in the most exposed spots. The upper portion of the range appeared entirely bare, the surface consisting of nothing but angular fragments of the rock, of which the peaks are composed. The snow in the upper beds was wrought, if I may so express myself, by the action of frost and thaw into pinnacles, which during sunshine, presented thousands of glittering objects. The few plants found above 13,500 feet were different from any that I had met with elsewhere; the only animals observed were a large hare, and a covey of the snow grouse, Koki-i-dusrah of Affghanistan, the Tehoo or Gallus Neillii of Mr. Gould. The general character of the Koh-i-Baba is great barrenness, this it shares, I have been told, with the Hindoo Koosh, and generally with the Paropamisus, of which portion I have not much direct knowledge. To these three ranges, the Hindoo Koosh, the Koh-i-Baba, and Paropamisus, and perhaps with the western extremity of the Himalyas Proper, I should be disposed to assign all the ranges to the north of the valleys of Peshawur, Jilalabad, Cabul, Ghuzni, and Candahar.

The Sufaid Koh, or Espeen Gar, which in Pushtoo has the same signification as that of the Persian name, is perhaps as lofty as the Kohi Baba, and like it, although more exposed to the effects of heat and the influence of the great plains of India, presents traces of snow throughout the year. This range is seen to perfection from the valley of Jilalabad, the southern boundary of which it forms. It is continued directly, I believe, down in line with the right bank of the Indus as far as Beloochistan, regaining, as far south as the Tukht-i-Soliman, a considerable portion of its loftiness. The Sufaid Kohi is by no means uniformly bare, as is the case with the previously mentioned mountains; many parts of the southern boundary of the Jilalabad valley are covered with Fir forests. Similar forests occur on other portions, such as those about Taizeen. Fir trees also occurred on certain parts of the return route of the Bombay Army, as I was informed by Lieutenant Marriott, of the Bombay Engineers.

To the Sufaid Kohi, I am disposed to refer all the ranges along the right bank of the Indus, as far perhaps, or farther, than Brahooistan,

and all those to the east or south-east, or south of Cabul, Ghuzni, Candahar and Quettah.* Of the mountains of the Khilat territory I have no personal knowledge, nor do I know to what system of mountains they are approximately referrible. On surmounting the crest of the Kharlekhir pass, peaks of considerable altitude covered with snow, at that season at least, were seen to the south.

A high mountain, Chiltern, rivalling Tuchatoo in height, towered over the valley of Quettah to the south-westward of the town, but with what chain this was united, I do not know. It will be readily seen, that this grouping of the Affghan mountains is only approximate, if even this much share of truth can be claimed for it. Mountainous systems, like all others, pass into each other by numerous ramifications: an intimate knowledge of which is only to be attained by close and extensive acquaintance with the features of the country.†

I have before alluded to the barrenness of the Hindoo Koosh and Koh-i-Baba; this is a general characteristic, equally affecting their low offsets and the culminating ridges as far as an altitude of 15,000 feet. This barrenness may be said to be comparatively absolute; that of the barest portions of the lower ranges of the Himalayas between Bhar and Simla is rich and luxuriant clothing, compared with what occurs in Affghanistan. Of the structure of these mountains, I regret not being competent to give an account. Very generally their surfaces are immediately rocky, except in some of the offsets, interposed between the Sufaid Koh and the ranges derived from the Hindoo Koosh, towards the western end of the valley of Jilalabad. There they are composed of sand, in all degrees of softness and induration, in which last state it becomes tabular. Alternating layers of a conglomerate, often exceedingly hard, are to be met with in this sandstone. Exceptions also occur in the valley of Bamean, on both sides of which the offsets are composed of earthy or clayey materials of varied and rather vivid colours. Generally speaking, the Affghan mountains did

* It is this range that will best repay the trouble of future botanical investigations. Its isolated situation, and its elevation as well as prolongation to the southward, invest it with peculiar interest. From a few specimens brought to me at Khaffal, I apprehend its Flora will approach to that of the Himalayas.

† The appearance of the highest ridges and peaks of both these chains appeared to me to resemble such as I had seen in the far more magnificent Himalayas.

not appear to me difficult of access; in this respect they are widely different from the other mountains I have traversed. It was found to be a general feature, that they might be ascended and descended, by making use of the beds of the draining streams which are very generally dry, except in the season of floods. These ravines, are gently inclined planes, the steep ascent only commencing on reaching their heads; and this perhaps in no instance exceeds 1,200 feet.

A section of an Himalayan ravine may be, I think, correctly taken as wedge-shaped ∇ , that of the Affghanistan ravines would be a broadly truncated wedge \sqsubset . The base line of an Himalayan ravine is again a succession of steps, with intermediate, more or less level spaces; that of an Affghan ravine is an uninterrupted inclined plane. The bottom of an ordinary hill ravine, again, is generally choked up with fragments, torn from the sides, or by boulders of various sizes rolled down from various distances. The bottom of an Affghan ravine may be in contra-distinction stated, as being almost evenly strewn with moderate sized boulders or shingle.

The vallies, enclosed by these mountain ranges and their innumerable offsets, vary much in altitude, and a good deal in nature, and have been formed perhaps by two different causes.

I am unable to state whether they usually present any definite direction with regard to the mountain ranges, except on the southern face of the Koh-i-Baba, in which direction they are, in the usual manner of the Himalayas, parallel to the chain.

The ordinary form of these valleys is generally very narrow, the tillable soil is confined to a narrow strip along the line of drainage. The space between this portion, and the bases of the outcropping boundary hills is an inclined plane,* strewn over, and indeed entirely formed of boulders and shingle, generally without a particle of soil. These slopes, very aptly termed by that talented officer Lieutenant Durand, of the Bengal Engineers, glacia slopes, appear to my limited experience, characteristic features in the physical configuration of the country. I beg to subjoin a rude attempt at a sketch of a very

* Without personal knowledge of the country, it is almost impossible to imagine the extent of these glacia slopes, and the enormous proportion they have to that of the tillable soil.

marked one on the left bank of the Cabul river, below Jilalabad, and opposite the village of Chardeh. As instances of these vallies, I may cite the valley of Shawl, which is not however characteristic; the valleys of the Wighand at Turnah; of the upper parts of the Cabul river; of Jilalabad, and of Koonur. In the only vallies of the Toorkistan face of the Koh-i-Baba, with which I am acquainted, these glacis slopes are not developed to any extent.



Characteristic Affghan scene north of Chardeh, shewing the glacis slopes, the undulated lower ranges, and the frequently isolated hills.

The other form of valley, to the existence of which the country is almost entirely indebted for its agricultural produce, are of considerable width, their bottoms are apparently almost level, and entirely covered with tillable soil, except towards the boundary hills along the bases of which glacis slopes very generally occur. Their principal distinction rests therefore on the amount or extent of tillable soil, the proportion of which is reversed in the two forms. As instances of these, I may adduce the valleys of Peshawur, of Candahar, and the vicinity of Cabul, and perhaps the whole line of country between Mookhloor and Nannee, near Ghuzni. Perhaps the best marked instance is the valley to the immediate west of Cabul.

The formation of some of these valleys is easy, and it appears to me naturally explicable by assuming their having been the beds of inlaid lakes. By this assumption it is, I believe, that Dr. Lord has explained the formation of the vallies of Cabul, Jilalabad, and Peshawur, in Dr. Lord's report or account of the Koh-i-Daman, *Journal of the Asiatic Society*, June 1838, will be found some geological speculations, to which I, although not professing any acquaintance with geology, beg

leave to object. The three vallies, cited by Dr. Lord, as having been once large basins, do not, as they now exist, present that amount of similarity of features, or, in other words, of affinity, which chiefly authorises us to ascribe formations to similar agencies. And the only one which, it appears to me, is naturally explicable by the hypothesis of Dr. Lord, is that of Cabul, which presents a tolerable level surface surrounded in every direction by hills. It may even now be said to be a marsh. The valley of Jilalabad presents soil, such as may be imagined to have been a deposit from tranquil water, only along the course of the draining river, which, as Dr. Lord correctly mentions, hugs the northern edge.

Between Bala Bagh and Pigdulluch, which looking to the boundary mountains, appears to me to be the western extremity, or part, rather of the valley; it is, if I may so express myself, blocked up by a low series of sand hills and the table land of Gundamuck, from which there is a descent again, over other sand hills, to Sooi-khab.

The space between the southern bank of the river and the Sufaid Koh, or southern boundary, is occupied by an enormous glacis slope, intersected by the northern draining torrents of the range, along and about which, here and there, small and generally well cultivated valleys occur.

If the great valley of Jilalabad, therefore, had ever been occupied by a grand sheet of water, or if it ever presented in other words the features that now characterise the valley of Cabul, great changes must have subsequently occurred.

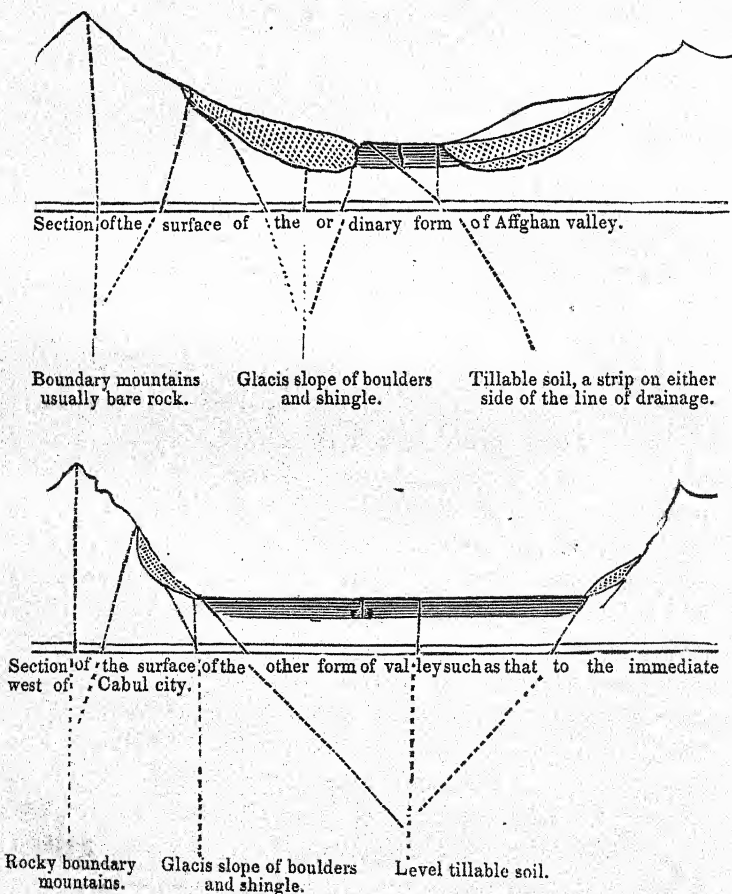
The Khybur pass which was selected by Dr. Lord as the exit to the "mighty rush of waters," did not appear to me to present any greater evidence of unusual water action than did any of the other characteristic passes of the country. Neither can I omit observing, that the assumption of the necessity of more energetic means in former times to enable nature to carry her measures into execution, is not consonant with those modern doctrines which believe, unless I am mistaken, that the causes now in operation in modifying the surface of our planets, are fully competent. The valley of Peshawur, as it now exists, is open freely towards the Indus. The Greedur Galli is a small ravine, presenting fewer traces than usual of the action of water, affording an easy cut across a spur of the

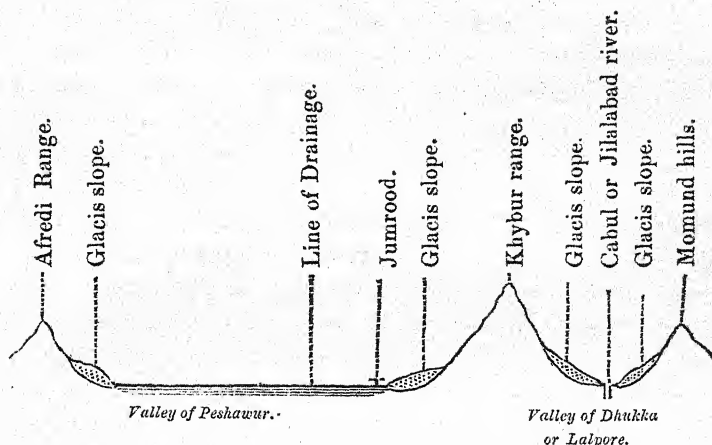
Afredi range, which forms the south-east boundary of the valley. If the water of the great basin selected this as the direction of the least resistance, that part of the valley now open towards the Indus must have since undergone depression. Dr. Lord supports his hypothesis with considerable ingenuity, but he has omitted to observe, that the rolled pebbles of Jumrood are not limited even to the most extensive allowable sphere of action of the rush of the waters of the Jilalabad basin, but form a well-developed belt or glacis slope all round the bases of the boundaries of the valley. Nor does Dr. Lord mention that boulders, constituting glacis slopes, exist on the west side of the Khybur pass, from its mouth to the Cabul river at Dhukka, that is, on the side of, or in that which he assumes to have been, the great basin. If the boulders and shingle, composing these vast extents of glacis slopes are found to have been constituent portions of the ranges of mountains, their formation is, I think, naturally explicable, by the agency of floods, which are no doubt frequent and severe during the spring months. The intimate mixture of the boulders and shingle, by which I mean smaller water-worn stones, which may be observed even to the rather sudden transition to the tillable soil, may be explained perhaps by allowing great inequalities in violence of the floods. But I think I have more than once seen these water-worn stones and boulders lodged on the sides of mountains in situations which would not, as it appears to me, warrant us in the invariable adoption of such an agency, unless I am mistaken. I might especially refer to the sand ranges about Gundamuck, on which, unless my recollection fails me, boulders are abundantly strewn, and which could not have been brought to their present situation by the action of water. It would be, however, useless to speculate further on a point which a practised geologist would determine at a glance. I fear that I have already infringed the principle, that no one is authorised to remark on things he has not studied.

I return to my impressions on the physical features of Affghanistan. This country is also, I think remarkable, always keeping in view that I write, drawing my comparisons from India, the country with which I am better acquainted than any other, for the smallness in number and size of its rivers and streams. From the general dryness of the Rivers and Streams. climate, perhaps many springs cannot be expected, and the summer supply will be almost entirely confined to the streams,

which drain the loftiest ranges on which snow is to be found throughout the year.

In most of the mountainous parts of India, I have seen almost every ravine give exit to a water-course, but this is not the case in Affghanistan. In the Bolan pass water is plentiful enough, and at Sir-i-Bolan, which the Affghans consider as the head of the pass, a beautiful and copious spring gushes from the rocky southern side of the gorge. But from this to Sinab, a distance of about 24 miles, and where there are *kahreejees*, not a drop of water is procurable, unless rain has very lately fallen.





Superficial oblique section (not drawn in proportion) of Peshawur valley, of the Khybur range, and valley of Dhukka, to shew that glacis slopes of boulders and shingle exist in the Afredi, as well as the Kybur side of the valley, and as well on the West as on the East side of the Khybur range.

The Kojuck pass is much less supplied; there is a good spring near the head of the ravine up which the road runs, and there is also some water at Chummun, on the north face of the range, 3,000 feet below its crest. But between Chummun and Kelah Abdoolla, no good water is procurable, and even at the last mentioned place the supplies obtained were brackish; the same comparative scarcity occurs in the road to Bamean, above Sir-i-Chusma, and it is only when one arrives within the drainage of the Helmund, that most of the ravines present small supplies of water in the Khybur pass. There is no water until Sundyck-hara is reached; the bed of the ravine by which the army descended from Lol-Ghurree Beg, was found to be dry to within one mile of Ali Mussid, at a place called Sir-i-Chusma, where there are copious supplies from a sort of cavernous limestone. Indeed, this rock seems to be the principal source of the perennial waters of the country in those parts beyond the influence of the melting of the perpetual snows. It is the source of the supply at Sir-i-Bolan; at Mookloor, or the head of the Turnuk; at Sir-i-Chusmah or the head of the Cabul rivers; and the place of the same name I just mentioned as occurring in the Khybur Pass. I, whose journeys had been confined to the North-eastern portions of British India, was particularly struck with the small number of natural

springs. On this depends, I am disposed to think, though perhaps in a secondary point, many of the peculiarities of Affghan vegetation. But few as springs are, and few as streams are, the effect is heightened by the quantities of water expended in irrigation. To this, and in a greater degree to great absorbent powers of soil, is to be attributed the not unfrequent occurrence of the actual disappearance of the streams in Affghanistan, at various distances from their sources. This may be observed both in the Kojuck and Khybur passes.

Before remarking on the only two rivers in the country worthy of any detailed notice, some observations on the lines of drainage may be necessary.

The main lines are two, one easterly, towards the Indus, the other westerly, towards the lake of Seistan; of course in both cases there will be many minor modifications.

After crossing the Bolan range until one arrives within the influence of the Logur, between Ghuzni and Cabul, all the streams observed flowed westerly. From the point mentioned all flowed easterly, and perhaps a line drawn due north from near Sharkabad to the crest of the Koh-i-Baba, will describe the approximate direction of the division of the two lines of drainage now alluded to.

The chief river of Affghanistan is the Helmund, the principal feeder of Helmund River. the celebrated Seistan lake. This river has a course of perhaps 400 miles, and arises in the southern face of the eastern portion of the Koh-i-Baba, or western of the Hindoo Koosh. I have only seen it towards its head, at an elevation of 11,500 feet; it is at Girdun Dewar, where it is crossed going to Bamean from Cabul, by a small river, knee-deep in the cold weather. At Girishk, the Helmund is a large and a rapid river. I am not aware whether this river is ever made use of for the purposes of descent; the only use, so far as intercourse is concerned, that the collected waters of so variously levelled a country can be put to. But connected with the small distance of Girishk from Candahar, (40 miles,) the valley of the Helmund is worthy of being surveyed, with a view of ascertaining its mineral resources. Connected too with the subject of wool, its capabilities of affording a rapid means of descent to within 40 miles of the second place in the country should not be lost sight of, more particularly if any of the upper parts of the valley are great sheep resorts during the shearing season. Were

there any reasons for supposing that forests of any description existed in the same direction, an enquiry would be still more necessitated.

The only other river I shall notice at much length is the Cabul

Cabul River. river, by which name the large body of water that falls into the Indus just above Attock, appears to be generally known. This river has its chief origin from a copious spring at Sir-i-Chusmah, about 37 miles to the east of Cabul. It drains the well cultivated Mydan valley, but is quite insignificant until it joins the Logur in the valley of Cabul, and even here it is easily fordable. On leaving the valley of Cabul, it enters a mountainous district through which it continues to flow, until it emerges into the valley of Jilalabad, near Baler Bagh, where it receives the Soorkhab, a considerable tributary arising in the Sufaid Koh.

At Jilalabad, the Cabul river is of considerable size, and of a mountainous character; two or three miles below Jilalabad, it is joined by the large river which drains the Koonur valley, and which is known, I believe, by the name of Rania in the lower parts of its course, and of Koonur in the upper. The Cabul river then ceases to be fordable; it continues to hug the northern side of the Jilalabad valley, until it enters the Momund hills, which connect the offsets of the Sufaid Koh with those of the Hindoo Koosh, or western parts of great Himalaya, at the Abkharah, a few miles below Dhukka.

It continues to be confined by these, until at Mucharr it emerges into the valley of Peshawur.

From Sir-i-Chusmah to Jilalabad, this river is of no importance except agriculturally. But from Jilalabad to Peshawur it assumes an additional importance, by affording means of safe, and generally rapid descent. For this purpose it is navigated by rafts, floated on inflated skins, the only mode resorted to by the Affghans, except at Lalpore, where the ferry is carried on by means of one large boat. These rafts are perhaps the safest possible conveyance, and are admirably adapted to such rivers as those of Affghanistan. They are very buoyant, and some of the skins may be burst without causing danger. Indeed, if care be taken in properly securing the frame-work, a serious accident can scarcely occur.

Descent by this river is a good deal resorted to, especially when the Khybur pass used to be disturbed. It saves a distance of ten marches,

and when the Indus becomes a channel of greater traffic, it will be probably by this route, that most of the exports will leave the country ; for the rafts would experience no difficulty in proceeding to Kalabagh, and there discharging their loads into the boats of the Indus. The rafts would then have to be broken up, and the skins to be carried in a collapsed state to Jilalabad for a fresh journey. During the floods, the distance between Peshawur and Jilalabad may be traversed in 12 hours, the distance by land being about 100 miles.

The Koonur River deserves considerable notice from being similarly

Koonur River. navigable, and from the forests which occur along the tributary which passes Olipore, and falls into the Koonur river at Chughar Serai Pareen. It presents the most feasible plan of supplying Jilalabad, and especially Peshawur, with fine timber and good fuel. The Olipore branch of the Koonur river comes, I believe, from the more western parts of Kafirsthan ; it is a large torrent, and is crossed by wooden bridges, on the same principle, but of much worse construction than those of Bootan, or by beams thrown across.

At Chughar Serai Pareen, where it is rather more gentle in its course, it is fordable with some difficulty in the cold weather. The main branch, which drains the little Chughar valley, is perhaps the larger of the two ; united they form a stream which I think exceeds rather in size the Cabul river at Jilalabad. Both these rivers practicable for descent, may possibly come into considerable play, should any great stimulus be given to the wool trade of Affghanistan ; the low tracts along both being frequented in the cold months by the flocks of the Nomadic tribes.

The waters of the Arghandab and Logur, are chiefly used for irrigation ; by the latter small poplar timbers are floated during the floods

Urghandab and for the Cabul consumption. The Arghandab passes Logur. within three or four miles of Candahar, and though fordable, is a stream of some size. The Logur passes within a short distance of Cabul ; it is scarcely as large as the Arghandab. It is in the direction of these streams which may be descended during the floods by rafts, that search for coal or any other valuable mineral product should be encouraged. Timber is, I fear, scarcely to be expected. Both these cities would double their importance, should coal mines be found within the range of either of the above rivers.

The only lake in the kingdom of His Majesty Shah Shoojah known
Lakes. to me, is that of Cabul, which is of some extent. I am not aware of its being of any other use than supplying the market of Cabul with water-fowl, and ice during the winter, and affording in the same season healthy recreation to Affghans and Europeans.

Of Hurmal, or chalybeate springs, I observed only two ; of these the
Springs. most striking one is a chalybeate on the Siah Sing torrent, in the direction of Bamean ; it is perfectly clear, and emits copious bubbles, depositing copious sediment of red powder, by which all the turf and plants around are covered. The Hurmal springs, if they can be called so, occurred at Gurmah ; of three examined by Dr. Henderson of the Sappers and Miners, the hottest had a temperature of 81° and 82°. Small salt springs do not appear to be uncommon in the valley of Bamean, but are not, I believe, put to any use by the natives.

Having thus attempted a sketch of the physical features of the country, I pass to another great natural feature, the absence of forests.

It is only eastern Affghanistan that possesses forests. From Dadur to Tanjeen, three marches from Cabul towards Jilalabad, nothing wild, worthy of being considered a tree, was to be seen by the Army. An involuntary exclamation of surprise escaped me, on reaching the crest of the Huft Kotul pass, from which the fir-clad ridges above Tanjeen are visible.

The Bolan pass, beyond a few miserable Rairoo trees* may be said to be absolutely devoid of arboreous vegetation ; some pollard-looking Sehnee trees exist in the ravines of the Khojuck range, elsewhere not only are these absolutely wanting, but there is nothing like luxuriant shrubby vegetation. The forests of eastern Affghanistan are limited to the Sufaid Koh and to the Sub-Himalayas north of Pusheet and around Olipore, lat. 34° 54' 38," long. 70° 12'. On both of these mountain chains, firs, Zaitoon, and oak forests are common. Other forest trees occur on the Kafir mountains within a few miles of Olipore ; of these the two most striking are the horse chesnut, and a beautiful abies or spruce fir, apparently allied to the Morinda or Khutrow of the Himalayas. These are only known to me from specimens purchased from the Kafirs.

* Acacia ?

The transition from the absolute barrenness of the Hindoo Koosh to the finely clothed Himalayas, certainly takes place somewhere to the north of Pusheet, or between it and Jugdalluck. It would appear to be almost sudden, both firs and the Zaitoon ceasing abruptly; the Baloot only straggling as far as Jugdalluck, about which it is a stunted tree, very much like a holly. During my stay at Olipore, I was of course anxious to ascertain to what causes the general barrenness of the Affghan mountains was to be attributed. Independently of consideration of climate, a primary cause appears to me to exist in the want of soil. Tillable soil exists on the mountains around Olipore, which are consequently inhabited, and partly cleared. That soil is rich, and of considerable depth, the bare rock being only exposed where the inclination of the strata approaches so near the perpendicular, that no lodgment of soil can take place.

The bare mountains, however, present very different circumstances; they are almost entirely, or quite, devoid of soil, rocks project in every direction, the intervening spaces being strewed with angular debris by no means sufficiently comminuted. These mountains are never cultivated, and sustain nothing but arid-loving thorny and aromatic species, which almost invariably occur solitarily.

The Sufaid Koh is the range best calculated for the complete investigation of the extreme inequality in the distribution of forest, for it unites in many places the characteristic features of both series of mountains, and it is this circumstance which leads me suspect, that the bareness is in some measure independent of climate.

The matter is of some importance connected with any attempt that may be made to improve this deficiency in the dominions of His Majesty Shah Shoojah.

On the climate of Affghanistan I am not able to present any details, Climate. such being only compatible with a residence of some continuation, as in all mountainous countries a great variety of local climates will be found to exist.

The general peculiarities, as compared with North-western India, are the confinement of the rainy season to the winter and early spring months, and the great dryness of the remainder of the year.

The peculiarity of the climate of the higher districts is excessive winter cold; of the lower, excessive summer heat. Even at Candahar,

which is in lat. $31^{\circ} 35' 33''$ and at an elevation of nearly 3,500 feet above the level of the sea, the direct heat of the sun in May and June cannot be much less than 125° to 130° . Throughout the lower districts, during the hot months, westerly winds, often assuming the character of hot winds, are prevalent.

They were very incommoding at Candahar, and were rendered very hot from blowing over a desert of some extent, a short distance to the westward of that city. In certain places, these winds become quite deadly; their fatal effects have been especially experienced in Kutch Gundava, but they are dreaded by the natives in some parts of Affghanistan itself, as on the stony desert between Ali Baghan and Chardeh, near the valley of Jilalabad. In such they are I believe, known by the name of Badi Simoom.

Little or no dew is deposited in Affghanistan except in the spring months, and in those places, such as the Chummuns, where the water is very near the surface, and along the immediate vicinity of the lines of drainage.

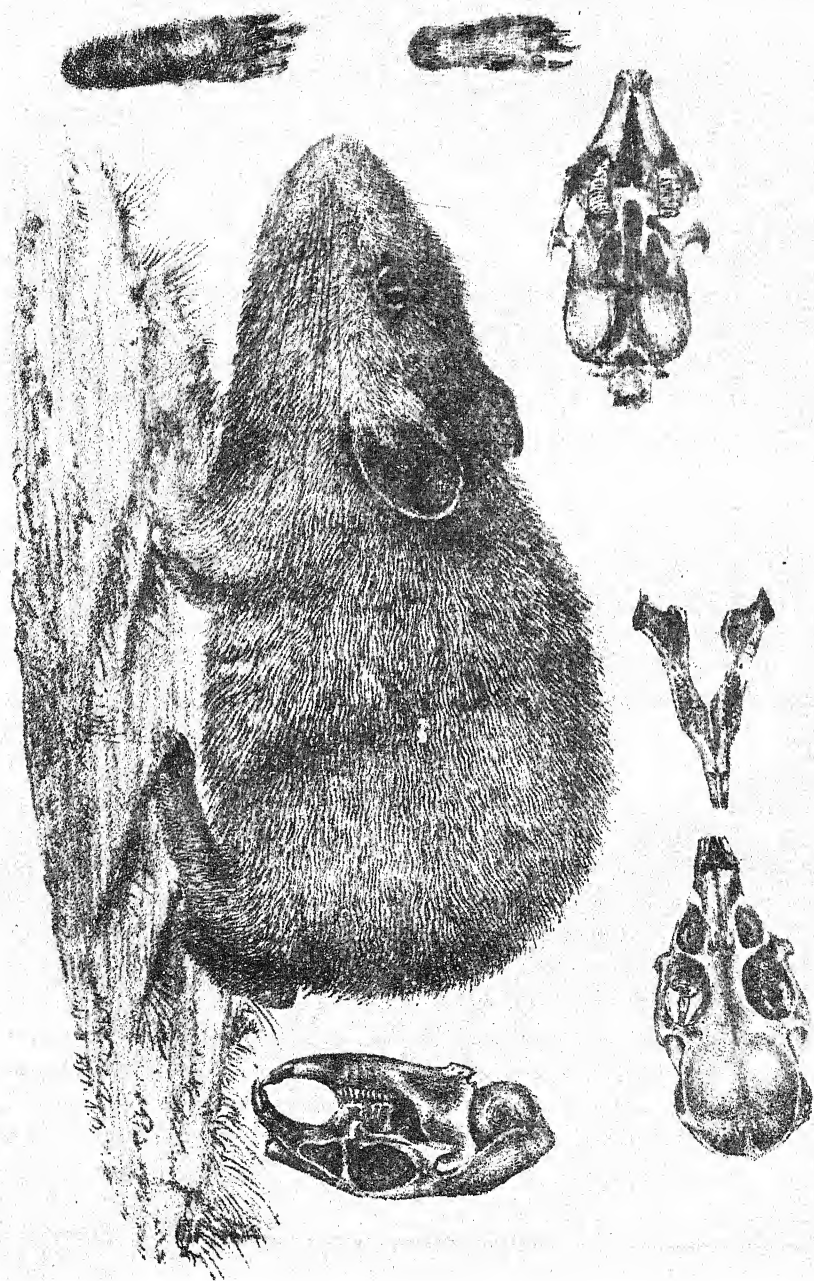
I have seen it mentioned in books of some authority, that dews are the providential means by which plants are supplied with moisture in arid countries. To this opinion I do not subscribe; it certainly does not apply to Affghanistan, as I had opportunities of observing during the marches of the Engineer department. If the deposit of dew depends on the presence of moisture in the atmosphere, I do not see how it can be a phenomenon of general occurrence in Affghanistan, in which, except at the season and in the places alluded to, the air is always remarkably dry. The other circumstances known to attend on its deposit, are all favourable throughout the country, particularly the nightly lowering of the temperature, and cloudless skies. I conceive it to be probable, that in the places alluded to, as presenting deposits of dew, these may be the effects of moisture derived from the soil during the day, more especially towards its close. This moisture would be deposited during calm nights, presenting the other required conditions. But throughout the greater part of Affghanistan, the habitual summer dryness is not modified by any such source of moisture.

Description of another new species of Pika, (LAGOMYS) from the Himalaya. By EDWARD BLYTH, Curator of the Asiatic Society.

The genus of the Pikas, (*Lagomys*, Cuvier,) which, until the comparatively recent discovery of a species upon the Rocky Mountains of North America, by Dr. Richardson, was known only by the figures and elaborate descriptions supplied by Pallas of three species, inhabiting the Steppes of Northern Asia, has lately been detected upon the Himalaya range by Dr. Royle, who carried home a single imperfect skin of a decidedly new species from the Choor Mountain, (subsequently to which, however, other and perfect skins have been obtained,) while another new species is now figured and described, (Plate —) by Mr. Hodgson from Nepal, to which I have the pleasure of adding a seventh, recognised by Captain Broome, as of common occurrence in Lahoul, Ladakh, and Kooloo, and which extending westward, may possibly also be the "small species of *Lagomys*," noticed by Captain Thomas Hutton, as an inhabitant of the hills of Afghanistan.*

The materials for description consist of a skull and perfect skin, (now mounted,) which were presented to the Asiatic Society, by their late Honorary Curator, Dr. Evans. The animal is in all respects a typical *Lagomys*, which precludes the necessity of entering into such details, as are of generic rather than specific application. From Dr. Royle's species, (*L. Roylei*, Ogilby,) and that now described by Mr. Hodgson, by the appellation *Nipalensis*, the present animal is at once distinguished by its inferior size, measuring but 6 inches in length, though the condition of the skull proves the specimen to have been fully grown, and its sex is male; from heel-joint to extremity of middle toe-nail measures $1\frac{1}{4}$ inch, the ears (posteriorly) $\frac{7}{8}$ inch and $\frac{3}{4}$ inch broad; and the moustaches are very long, a few of these vibrissæ exceeding $2\frac{1}{2}$ inches, and passing considerably beyond the tips of the ears. The general cast of colour, approaches that of an English Water Vole (*Hypudæus Aquaticus*), judging from memory of the latter, having a distinct rufous tinge, and the fur, which is delicately soft as in all the genus, consists, as usual, of two kinds, differing only in the longer having coarser tips of another colour, which latter is alone visible at the surface; these

* Vide Calcutta Journal of Natural History, vol. i. p. 558.



longer hairs are $\frac{3}{4}$ inch in length, and for rather more than $\frac{1}{2}$ inch are slaty-black, then pale brown, afterwards more rufous brown, and finally tipped with a dark colour; the under-parts are dull whitish; the feet pale brown, with a faint tinge of rufous above; the anterior moustachial bristles dull white, and the posterior portion of the same tuft blackish; and the ears are nearly naked posteriorly, having only a slight downy tuft near their base, and a scanty border of minute hairs near the margin, while anteriorly (or within) this border is more developed on the outer side, and there are some long hairs growing from the inner corner; the form of the ears is a rounded oval, with a very slight indication of a terminal angle at the extremity of the outer edge, the margin being slightly fringed with whitish; the nose is completely hairy; there is a more decided tinge of rufous on the forehead, and on the sides of the neck toward the fore-limbs; and the ear has the usual internal conch, or involucre, observable in other members of this genus. The skull measures $1\frac{5}{8}$ inch in total length, and $\frac{7}{8}$ inch across at the *zygomæ* near the hind edge of the orbits; from front of bony palate to inferior margin of occipital foramen not quite $\frac{7}{8}$ inch; and the vertical height, with lower jaw *in situ*, $\frac{7}{8}$ inch. I cannot do better than apply to this species the name of *Lagomys Hodgsonii*. It is obviously distinct from all the others.

It may be remarked, that a fossil species of *Lagomys*, from the Osseous Breccia of the Island of Corsica, is noticed by Baron Cuvier, who describes and figures the skull in his "Ossements Fossiles," tom. vi., page 598, (6th edition, and plate 175,) figs. 4, 5, and 6.

Literal Translation of the Dhavala Inscription. By Pundit

SURODAHA PRASADH.

1. May the (rays of the sun) which remove darkness, protect you.
2. The four-headed (or *Brahma* was) enamoured of *Sabitre*, the wife of *Surya*, (Sun,) from whom was born *Harivarna*, who was the ruler of the whole world. He was, as it were, the rising sun amidst the new clouds to the lily-like eyes of all, and who further deprived the females of his enemies of the beauty of their moon-like faces, (*i. e.* by causing the death of their husbands.)
3. And who has grown wise by his (constant) exercise and compassion. *Viswavarna*, was in morals like the sea rising high by the influence of the moon-beams, and glorious as having possessed the loft and ancient Jaina temple, which deprived the peaks of Himalaya of their splendour. By him (was ***) by means of gifts ——— was well as to the Gods ———
4. ——— From him was born *Aroma*. ——— From him sprung *Dhavala*, like the moon-beams from the moon, enlightening the whole world. He, while on his elephant, (in battle,) cut off his enemy's army, and thus noted his revenge.
5. A multitude of Rajas of the wild countries ——— *Soobha Raja* was born. He continually and wonderfully enjoyed (?) by the might of his arms. ——— He restored the army of (?) (to battle) who were defeated by those of *Anuchandra*. He (*Dhavala*) established two (images) of Gods.
6. ——— (He who was) superior to all, established tranquillity among his people. ——— The Raja *Dhoronivara*, who was himself very wise and great, threw head-long (expelled) the Raja *Kondesika* from his dominions in the jungles, as an elephant throws a tree, and a boar a young *koal*, (a kind of boar.)
7. As* one takes his rest under a tree when fatigued with the burning sun, so the multitude have taken their refuge under him (or under the cool shade of his arms.) He was beautifully mild as the moon. Sung (the fame) of (him,) who was as the crest jewel of all the archers, and always devoted to his spotless (true) faith. He was the follower of ———

* One whole sloka, measuring 13 letters in each stanza.

8. At his (Raja's?) expedition towards his enemy's dominions, the Sun obscured with dust (rising high) from the earth, while passed over by his army, was as it were, obliterated in disgrace, from the firmament, being totally overpowered by the spirit (of this Raja.)

9. ——— (He was?) like the sun तेजोभिः in spirit; *Boudha* in compassion; *Yudhisthira* in wisdom, truth, and virtue; *Pralayanila** in might; the minister of *Indra*; (*Vrihaspati*) in counsels; and (*Cupid*)† in beauty, which is attractive of female minds.

10. ——— (He) who was fortunate and virtuous, safely performed the ceremony agreeably to the doctrines (of *Veda*,) which had ever been performed by the Gods themselves and ——— for *Kali*, never creates any interruption in such affairs, when undertaken by a man of virtue (as this.) (Besides) men having even in *Kaliyuga* perceived the spotless ——— this Raja.

11. The Creator having as if considered it (?) proper to be placed together with talent, *palace* ——— beautiful as the moon-beams. Who else could describe it in its full length? The kingdom of this Raja was *Hastikanehika*, which like the region of *Kuvera*, was inhabited by people of great fortune, and white like the ice (pearl) necklace, and like *Siva*.

12. ——— Equal‡ to the minds of those, who reside (together) at one and the same place ——— joy and health around ——— beautiful as washed gold, where (in the kingdom) not like the beautiful shafts of *Rama* ——— by others always amidst a crowd of both sexes ——— moderation, restriction (of passions) compassion, and pleasant converse.

13. (Slokas of double meanings, altogether untranslatable into English.)

14. His court Pundit, who was like the priest of the Gods (*Vrihaspati*) endowed with gravity and such other *natural* qualities ———

15. The splendour of a tank, (beautiful with the plants of full blown lotus) ———

16. ——— The whole heavenly region was struck with wonder, admitting it to be as if the second *Lokaloka* mountain.

* Wind at the time of Deluge.

† This comes out from sense.

‡ It is translated literally, but what the sense should be, is out of my ability to make out.

17. Having by his (?) instigation considered his wealth, wife, and sons, (family) unstable as the breeze of the fan.

18. (This temple) was illuminated (with the lustre) of the starry ornaments of female images, and exhibiting how far the power of architecture extend ——— having four corners shining with jewels, reddish like shells and pearls.

19. In this ocean of the world, established by those who are renowned. Formerly the *Vidagdha** *Raja* यदुत्तल was like the descendants of *Yodu* (*Vansa*) * * *.

20. ——— The powerful *Dhavala Raja* (having fought) in battle with Jainas ——— so long as the earth supported on the hood of *Ananta* will continue to wear the splendour of *Pattala*,† which resembles a temple supported by a silver pillar (so long shall this * * *.)

21. ——— The poet has written these slokas in best metaphors, &c. The priests who were superior in talents, moderation, and धुर्ध्य capacity, for holding burdens, performed many sacred rites.

22. ——— (He *Dhavala*) has with a view of discharging his debt to his ancestors, consecrated (dedicated) this (temple?) at Mahidhwaja (a village) in the Samvat year 1053, on the 27th Magh, while the Moon was in *Pushya*, (a planet.)

(Five lines obliterated.)

28. (This line is entirely obliterated, except the following words, "not formerly possessed by *Bidagdha*.")

29. (Ditto, except the words "even by the people of the town.")

30. ——— The earth has been enjoyed by many kings as the Sagara and others, and he who rules it in his turn, is the sole enjoyer of its fruits.

* The word *Vidagdha*, which means "learned," may also be applied as a name.
—S. P.

† A watery region below the earth.

Observations on a second Inscription taken in fac-simile from the neighbourhood of Mount Aboo. By Capt. BURT, Bengal Establishment, F. R. S.

In a notice of the Bussuntghur Inscription, (Asiatic Society's Journal, No. 116,) I made mention of another also sent to me from the same part of the country by Capt. Burt, which I hoped might, when decyphered, throw light on the dynasty of Rajpoot chieftains, whose names were therein first made known to us. Some trouble has been required to read this second inscription, which is to a great extent not to be made out, owing to obliteration of the characters. It is cut, Capt. Burt tells me, "in the interior of a gateway leading to Mandir, distant one kos from Beejapoor, on the route from Odeypore to Sirohee near Mount Aboo."

The date of this inscription is Samvat 1053, equivalent to A. D. 996, and it is consequently 46 years anterior to that taken from the Baolee, at Bussuntghur. It contains, also, as will be seen, notices of a new dynasty, and mentions a principality hitherto unknown. *Raja Dhavala*, of the race of *Viswawarna*, is represented as engaged in constant wars with neighbouring chiefs, and appears, on the consolidation of his power, to have followed the usual course of erecting, and dedicating a temple with pious reference to his ancestors. Lands and endowments were doubtless assigned in the ordinary mode for the maintenance of this shrine, the record of which has been obliterated with the erasure of great part of the inscription.

The facts which may be deduced from this ancient record, confirm the theory which I ventured, with Lieut. Cunningham's concurrence, to put forth, based on the Bussuntghur inscription, as respects the condition of Meywar subsequently to the first invasion of the country from Cabul, in A. D. 812. The presence in that inscription of the names of a new dynasty reigning over the country still called locally *Badari*, near Mount Aboo, about A. D. 1042, and the historical knowledge which we have of a so-called division by *Bhritripad*, about two hundred years previously of the territory under his domination among thirteen sons, led to the conclusion, that this list of names recorded the reign of a line of petty potentates, either descendants of *Britripad's* successors, or, as is more likely, of chieftains established in a small

principality by force of arms, after the temporary disruption of the monarchy at Chitore by the Mussulman invaders. The justice of this opinion is confirmed by the tenor of the *Dhavala* inscription now before us. Enough of it remains to give us evidence of the existence contemporaneously within the boundary of the ancient monarchies of Chitore and Odeypore of another petty state, whose princes we now, only have for the first time heard of in this obscure record of their acts, and whose territory may be perhaps yet, faintly remembered by some local appellation, or traditional record. The inference is natural, that similar mementos of other petty states established by the sword about the same period, during the time of political confusion may be still extant in Meywar. Their discovery would of course afford further proof of the truth of our suppositions as to the state of great part of Rajpootana, for two hundred years or more after the first Mussulman invasion.

Enquiry into such monuments of antiquity, however slow, and however desultory, has yet the advantage of adding something to the amount of our knowledge of the true history of India. Materials are gradually accumulating, whence in the course of time, a sound and rational account may be framed of men and things as they at various times have been in this vast country. From the inscription before us, meagre and mutilated as it is, we are able to find evidence of hostilities carried on at this period against the Jains, on the ground of religion, and noted in this record as an act of special merit. We are empowered to conclude, that in Rajpootana, war and foreign invasion had not as in other parts of India, (as evidenced by other inscriptions,) caused the pursuits of literature to be neglected, the style and language of the record being singularly good: the arts, as it appears by the description of the temple, continued also to flourish, and the power of the ruling prince was sufficiently well established to enable him to declare the doctrine of possession in right of sovereignty of the produce of the earth: "He who rules it in his turn, is the sole enjoyer of its fruits." The amount of information thus acquired is often but small, and the labour of attaining is heavy; but of such, let it be remembered, is the material of real history composed, and by such evidence alone are the errors and misrepresentations of tradition exposed and corrected.

A letter to the Secretary to the Asiatic Society, on the Nurma Cotton of Bundelcund, from J. G. BRUCE, Esq.

In compliance with a letter from the Secretary to the Government, North-Western Provinces, regarding the Nurma cotton produced in Malwa, and requesting I would furnish you direct with any information which I might possess on the subject, I have the pleasure to inform you, that the Nurma cotton, of which the fine Chundellee cloths are manufactured, is the produce of a shrubby perennial, cultivated in the vicinity of Chunderee, to the extent required for the fabrics of that place. I never heard of any being grown for exportation in its raw state.

The piece goods manufactured at Chunderee, I beg leave to inform you, consist principally of costly cambrics, turbands, and *seylahs*, or waist bands: these were of so beautifully fine a texture, that some of the higher numbers sold for two hundred rupees a piece, and were used by the Native princes and noblemen.

Although the Chundellees are so much dearer than the Europe cambrics, the Native princes give the former the preference. It is said to be more durable, and keeps the body cooler in the hot season; from the quality it is said to possess, of more readily imbibing respiration. Had it not been for this preference, the manufacture of the Chundellees would long since have been discontinued.

When I came to Calpee in 1808, I found some few plants of the Nurma cotton in the "Nuzzër Baug" garden, belonging to the Jallone Rajah. They had been sown before the seat of his government had been removed from Calpee in 1804 or 1805, to supply him, and his household, with the Brahminical* thread worn by the Brahmins (the Rajah himself was one) and higher castes of Marhattas. The cotton which these plants bore was beautifully soft, and of a good staple. I cannot, at this distance of time, distinctly recollect whether it was the smooth black, or downy grey seeded; but, as far as my memory

* The Nurma cotton was, no doubt, chosen for its length, strength, and fineness of fibre. Moor, in his Hindu Pantheon, page 379, says, "The Zennar is composed of three threads, each measuring ninety-six hands (cubits); they are twisted together, and folded into three; then twisted again, making it to consist of nine threads: these are again folded into three, without twisting, and each end fastened with a knot. Of these Zennars, a Brahmin wears four; the other privileged tribes three."

serves me, I think it was the latter. It appears to have been cultivated about Chunderee, rather extensively, some years back, to meet the demand there was then for the Chundellees at all the Native Courts.

It was customary with the Native princes, when they met together to celebrate marriages, or on other occasions of rejoicing, to present to each other, as well as their dependents, the Chundellee Mamoodies, (cambrics,) turbands, and seylahs, among other things, as Khillats. In fact, these were in requisition at the Courts of all the Native princes in Bundelcund, Malwa, and Central India generally; but since machinery has tended to lower so considerably the prices of Europe cambrics, the Chundellees are merely required for the personal garments of the princes.

Chunderee is a province of the Gwalior state, situated on the banks of the Betwa river, between Jhansee and Chutterpore. I imagine the Resident of Gwalior, instead of Indore, could more readily afford the particulars required respecting the Nurma cotton. In the letter from the Secretary to the Government of Bengal, it is denominated the Nurma cotton of Malwa. Without a more definite description, the Resident may suppose that the information called for, relates to the indigenous Malwa cotton, or *Gossypium Herbaceum*, which is the same as the common Bandah. It would prevent mistake, if the Nurma grown about Chunderee, from which the Chundellees are manufactured, was mentioned.

As Chunderee borders close upon Bundelcund, I think the Nurma cotton, which has already been acclimated to the country, and used for ages in the manufacture of the finest fabrics, may be grown successfully in the whole of Central India and Bundelcund, if not generally in the North-Western Provinces. The soils of the two first are similar; principally the rich black marl: that of the latter mostly clay and sand. The black marl seems to be decidedly the best for cotton.

There is another description of cotton, which is of a longer staple, and finer fibre, than the common country. It is grown about Omrawuttee, and known in the Mirzapore and Moorshedabad marts as the cotton of that place. It has, however, the disadvantage of being very greatly intermixed with leaves and dirt, from being allowed to fall on the ground, before it is collected. In consequence of its being found so foul, there was never any demand for it in Calcutta, but it was

dispatched overland from Moorshedabad, principally to Dacca and the adjacent districts, for the manufacture of the muslins. Notwithstanding it was so foul, it realized a better price, when I was concerned in the cotton trade, than the Banda produce.

Omrawuttee is a large trading mart, situated on the Poorna river, in the Nizam's country, bordering on Nagpore. Owing to the immense distance Omrawuttee was by land from Calpee, this cotton never formed part of the Company's investment. I was given to understand it was black-seeded, and originally of foreign importation.

I have tried, at various times, the Sea-Island and Upland American, the Egyptian, the Bourbon, and the Pernambuco cottons several years, on my own account, to the extent of fifteen and twenty beegahs at a time; and lastly, on a scale of four hundred beegahs, in partnership with two of the Calcutta mercantile houses in 1837, in the neighbourhood of Calpee, with, and without irrigation; but never at a remunerating price. My last experiment of four hundred beegahs happened to be made when the famine raged with so much severity in the North-Western Provinces; and I attributed the drying up of the plants, notwithstanding they had the benefit of being irrigated during the prevalence of the hot winds, to the unfavourableness of the season. The seed was put into the ground in March and April, and watered from wells, until the periodical rains commenced; but as soon as there was a cessation of rain, the plants began to wither, and although watered afterwards, became brown, and the leaves had the appearance of being scorched, and ultimately fell off, leaving a few capsules on the leafless plants, the produce of which, unfortunately, did not cover a tithe of our outlay.

I ascribed, as I have already stated, our want of success, solely to the untowardness of the times; but from what I have observed in the present season, with respect to the experiment now carrying on under the superintendence of Captain Bayles, and the American planters, I am inclined to believe that my failure was not entirely owing to drought: for the plantations at the four localities in Bundelcund and the Dooab, bear the same appearance, as mine of 1837 did, and the result is likely to be as unfavourable.

The American planters at the Farms commenced their cultivation of the cotton with the first showers of rain that fell at the end of June, and

beginning of July last. As long as the rainy season continued, the plants looked healthy and fresh. About the middle of September, the rains, it may be said, ceased; and almost immediately after, the leaves of the plants became brownish, and began to wither and fall off. This could not have arisen from want of moisture, as some of Captain Bayles' cotton fields had only, a few days before, been well saturated with the rain that had fallen.

Towards the end of September, the wind set in rather hot from the Westward, and I am of opinion, that the injury which the cotton sustained, is ascribable to it. If my conjecture be correct, I fear the American method of culture will never answer in Upper India, owing to the hot winds.

The American mode of cotton culture, I think, is, in one essential point, objectionable with respect to this country. It exposes too much of the surface of the soil to the rays of the sun; this is liable to occasion too rapid an evaporation of moisture. It has been found by experience, the "Purwa" soil, or mixture of clay and sand, will not bear it; and the black marl, I have had opportunities of ascertaining, unless it has lain fallow for some time, and is overrun with weeds, is seldom more than superficially turned up. The "*buckhur*," instead of the plough, is usually employed in the preparation of the black soil. It has an iron scythe, in the room of a share, about twenty inches broad, and five deep, fixed to a beam of wood, between four and five feet long, and six inches in diameter. The *buckhur* is peculiar to Bundelkhund, Malwa, and Central India generally. In the course of the day, as far as five or six beegahs of land are *buckhered*. The iron scythe, which is fixed to the centre of the beam, enters about eight inches in the ground, effectually cutting, and rooting up weeds and grass, and the beam pulverizes the earth as it is turned up. The sand intended for the Khurreef, or rainy season crop, is once *buckhered* before the seed is scattered. It is then ploughed to cover the seed, and prevent the birds from getting at it. The Rubbee land is two or three times *buckhered* during the rains, and merely sown with the drill plough about eight inches deep.

The cultivators of this district have an idea, that if too much of the soil is turned up, the produce is not so great. The black soil is subject to immense cracks and fissures during the dry months of the year,

which again fill with water and close up, after the rains have set in heavily. The cotton produced in this soil has ever been reckoned superior to that which is grown in the others. It is to be regretted that the Mexican seed, which Captain Bayles brought with him to this country from America, was not tried, in the first instance, on this soil, as the rains were uncommonly mild, and in a moderate season, the cotton in this soil grows best; it would have been the means most probably, of securing an abundant supply of seed acclimated to the country, to have commenced the following year, on a scale commensurate to the magnitude of the object the Court of Directors had in view; which, I am led to believe, from having had a perusal of their despatch on this subject, is the supercession of the supply from America, for the manufactures of Great Britain.

If Great Britain is ever to look for the supply of its manufactories to India, other measures, than those which have been commenced upon, must be resorted to. Ages must pass away, (if the present method of home cultivation ever succeeds, which however is problematical,) before India can respond to the demands of England.

The most feasible and simple plan, it appears to me, would be to follow the one which Captain Bayles partially adopted this season, at my suggestion, when I was ordered by Government to aid him, in fixing his localities. I procured him engagements from the landholders and ryuts, contracting for their labour at four rupees per beegah. They were to plough,* sow, weed, scarify, and do all the work that was required, entirely under the superintendence of the American planters. If the land-rent, establishment, and other expenses, trebled the amount, still the cost of the cotton would have been very moderate. The indigenous plant, when properly attended to, will yield at least an average produce of a maund of clean cotton; the Mexican, cultivated according to the American system, ought to give the same, if not more. Any mercantile man would pronounce a maund of American cotton landed at Calcutta, at twelve rupees, very cheap, and willingly engage for all that could be produced at such a rate through Captain Bayles' agency.

It is greatly to be lamented that the result of Captain Bayles' experiment proved so unfavorable in the present season. Had it been

* With their own cattle.

successful, those who had contracted for their labour at four rupees a beegah, might have been encouraged to have grown the cotton on their own account and risk. Until the landed proprietors and ryuts can be persuaded to do so, there is little likelihood of India ever being able to furnish the quantity, which America now annually sends to Great Britain.

I prevailed upon Captain Bayles to receive the engagements at four rupees a beegah, with the view of shewing the Government, and the mercantile community, at what specific cost the American cotton might be produced in Bundelkhund. Unless this was done, it appeared to me, individuals would hold back, from the impossibility of telling what the actual cost of a beegah, or maund of cotton, would amount to, under the "neez," or home cultivation system. The purchase and feeding of cattle, the cost of ploughs, the pay of the ploughmen and establishment, and innumerable other expensive items, were not likely to elicit readily this desirable information.

As long as Captain Bayles and the American planters cannot make the produce of their mode of culture yield a remunerating value in the market, it is unreasonable to expect, that capitalists will embark in the speculation, or the impoverished landholders and ryuts will relinquish their system, which, they consider, secures to them at least a subsistence, if not plenty.

It is worthy of remark that the American cotton, cultivated by the ryuts with their own small-sized cattle and country ploughs, at four rupees the beegah, under the direction of the American planters, was in every respect equal to what was cultivated on account of Government, with the large-sized cattle, and American imported ploughs, under the superintendence of the planters themselves. This proves that neither a costly plough, nor team of horses, are absolutely necessary. The loss which Government must inevitably incur upon the present year's experiment, is, in some measure, repaid by the acquirement of this valuable knowledge. For how, or where, could the poor ryuts have supplied themselves with such expensive agricultural appendages, if the successful introduction of this superior description of cotton, depended entirely upon the possession of them.

It having been ascertained that the means already in possession of the ryuts, will answer for the cultivation of the American cotton, the

next point to be considered is, the most expeditious way of accomplishing this highly important national object. As the cultivators, I am of opinion, will not engage on any other terms, before they have practical proof that a beegah of the American will yield as much profit to them, as their indigenous cotton: the most eligible plan appears to be, to employ the landholders and ryots to cultivate, as they did in the present year, by contracting at so much a beegah. If the Cotton Association, which has been established in England, will consent to undertake the risk, and come forward with the means, I am inclined to believe, that, in two or three years, a cultivation to almost any extent may be secured for the Association, through the agency of Captain Bayles, and other fit persons.

Humeerpore, 18th October, 1841.

Letter to the Editor, on Lichens in the Himalayas, from HENRY COPE, Esq.

I regret much to say, that in consequence of my having been obliged to leave Mussooree for this place some days since, the rich harvest I had promised myself, on the investigation of the Lichens, suggested by you, has been interrupted, and I have been enabled to do much less than I had promised myself; especially as regards the investigation of the Botanical characters of the plants in question,—an almost untrodden path, and therefore the more deserving of exploration, especially with the possible results likely to accrue to the arts before me.

I have now the honour to inform you, that I dispatched, previous to my leaving Mussooree, small parcels of seven kinds of tree Lichens; which, if found useful, are likely, from the respective quantity of each, to become objects of commerce. They are two species of *BORRERA* or *EVERNIA*, one of them that is commonly in use amongst the natives as a dye, and named by Dr. Royle, *B. Ashneh*, one species of *USNEA*, one species of *PARNULIA*, three of *RAMALINA*, and a small quantity of a species of *CLADONIA*. I have been very particular in sepa-

rating all other species and extraneous matter; and as I see by Dr. Hooker, that the presence or absence of the fructification is supposed to make a difference in one of the Dye Lichens he notices, I have put in two small parcels (paper), specimens of the B. Ashneh, with and without the fructification, for separate experiments. I have sent you also, for exhibition at the Meeting of the Society, branches of the Barberry (*Rusoot*, *Berberis*) which will, in some manner, illustrate the fact of the abundance of some of the Lichens, as whole trees are as thickly covered as the pieces I send you, and absolutely killed by parasite. There are very few Lichens growing on rocks; they are almost entirely confined to the trees (especially the extreme branches, where no doubt they can imbibe moisture more freely) and shrubs, but freely taking root amongst the moss, &c., on which they may occasionally fall from the trees, detached by wind or the birds. The greater part of those I have sent, are found on almost every kind of tree or shrub; but more particularly such as have the roughest bark. The *Rhododendron* alone seems almost exempt from them, though it has other less conspicuous species lodged on its smooth epidermis.

I had commenced a collection for the Hortus Siccus, but even that was unfinished, or rather only in its infancy when I left: but such as it was, I thought it best to forward it to you, as it may enable competent botanists to pronounce more positively as to the correctness of my nomenclature, which was, however, much improved by the assistance of a small except from his Herbarium sent me by Dr. Falconer. The number of species I have forwarded is 19, and I have no hesitation in saying, that it is scarcely a tithe of those to be found in the Himalayas. The greater part however will only be valuable as botanical curiosities, as they do not individually occur in sufficient quantities, to warrant the probability of their becoming useful in commerce.

I have, in a separate communication, endeavoured to give you my gleanings of all that is known respecting the various properties of the Lichens, and would beg the particular attention of chemists, and of your Curator especially, to the recommendation of Westring respecting the extraction of the dyeing principle from the Lichen, on the spot where it is found, as the chief cost of any article sent from the Himalayas over the capital to England, would consist of freight, &c.,—

a point of great importance in so bulky a substance. Should you require larger quantities of the Lichens, I can furnish them. As the mode of dyeing adopted by the natives, may not be generally known, I do myself the pleasure of handing you the same, with a few other details, which may be of interest.

Chulchelera is the name by which the *EVERNIA ASHNEH* is known in the Upper Provinces of Hindoostan, but not to the natives of the mountains, who have one general name for all plants growing on the bark of trees, viz. *Chal*, a word meaning the bark itself, with all that is on it.

As far as my information goes, the chief supply of the Doab is derived from the village of Nagul, no great distance (about ten miles) from Dhera, and the town of Khalsee, on the right bank of the Jumna. In these places the dealers in Lichen of Saharanpoor, (bunyas,) have correspondents, to whom they write at the commencement of each season, and mention the quantity if most probably required for consumption. These correspondents, also bunyas, notify their wishes to the petty chiefs or zumeendars in the hills, and the quantity ordered is delivered, the Paharees receiving either cash, but mostly salt, in payment. Each Paharee brings down a load of about 30 seers, packed in leaves, and bound with Moonjh, and has to pay the Gurwal Rajah, at established chowkees, a small duty, varying according to local arrangements with the chokeydars. The time for gathering the Lichen is January and February. The Nagul and Khalsee bunyas keep no stock on hand, but send all they receive to Saharanpoor. I am told the quantity annually exported to this town barely exceeds 100 maunds, (less than four tons,) of which about ten are used in the place and its vicinity, and the remainder sent further south. When first gathered, the Paharees are not particular in confining themselves to the genuine species required, but to hasten their work, tear off several other kinds, and along with them, break off the branches on which they grow. This, and those, give much trouble to the consumer, for the exporter below does not take the trouble of cleansing the article he receives, before he sends it forward. As the Lichen is only used during the earlier months of the hot season in the plains, any remaining unconsumed after these, is spoilt by keeping in bulk during the rains, and thrown away as worthless. The entrepots for the Lichen to the east

are Kassipoor and Philibeet in Rohilkhund, which derive their supplies from the Kumaon province.

The Lichen rarely finds its way into the hands of the regular dyers, as almost every Mussulman, and many Hindoos, know how to, and do use it as a household article of manufacture, thus saving the cost of the dyer's labour. One seer will dye from ten to fifteen pieces of cloth, of the ordinary length, made in this part of the country and about two feet broad. The article when brought in the bazar, is carefully picked, and freed from all extraneous matter, thoroughly dried in the sun, and rubbed with the hand on the rope bottom of a Charpae, till not only all the remaining particles of earth, bark, &c., are rubbed through, but until the whole assumes a white colour, by the peeling off of the dark under-surface, which you will observe on the plant. This process gives to the massive an almost silky softness. The Lichen is then put into as much water as may, in the estimation of the operator, be required to dye the cloth in hand, and boiled until the colouring matter is strongly given out. The dye water is then cooled, and modified by the addition of various substances, according to the taste or fancy of the amateur dyer.

These are chiefly Kutt, (Catechu, which is plentifully produced in the Sewalik Hills by the natives, from the wood of the *ACACIA Catechu*,) a pice weight of which, to the whole quantity, deepens the colour much; but is not generally admired. The Kutt is pounded, rubbed on the *seel* with water to a paste, mixed with more water, strained, and added to the Lichen dye. This is the way in which the following ingredients are also added.

2ndly. Mehendee leaves (*LAWSONIA inermis*) much used and admired.

3rdly. Pawn leaves (*PIPER Betle*).

4thly. Flowers of the Harsinghar (*NYCTANTHUS arbor tristis*,) which is indigenous to the Dhoon (valley) of Dhera, and its neighbourhood, &c. &c.

In order to give the cloth an agreeable odour, it is usual to add, when about to be dipped for the last time into the dye, a small quantity of the following aromatics, pounded, ground, strained, and in the same manner as the Kutt, &c.; viz., Nagurmothor, (root of the *CYPERUS rotundifolius*,) Kaphoor Kucheree, (root of the *HEDYCHUM spicatum*,) and Balchur, (root of *VALERIANA Nardus*).

The cloth is dipped once, twice, thrice, or even oftener, according to the intensity of the colour it is wished to impart, carefully wrung each time, and hand-dried in the shade. The cloths chiefly dyed are those used for pugerees or doputtas. Instead of washing, (which however they will bear without loss of colour,) the cloths are, when soiled, occasionally dipped in whatever portion of the dye may have been left, and put aside for this purpose.

The Saharanpoor bazar rate of the Chulchelera will give a very fair idea of the cost and charges of not only the Chulchelera, but of all the other kinds, should they become articles of commerce, and be sought after for exportation.

The Chulchelera, in its rude state, (that is as gathered with admixtures in the Hills,) is sold in Saharanpoor, when cheap, at rupees 1-8 per maund, or 7 pies the seer, (3s. per maund, or 4*l.* 4s. per ton); and when at the highest price, at from 2-8 to 3 Rs. per maund, which would give from 6*l.* 6s. to 8*l.* 8s. per ton. I have no doubt that, in case of an increased demand, the article would also rise in price, and that it would never be procurable at less than 6*l.* 6s. per ton; that is, rupees 2-8 per maund. At Saharanpoor, it would require (or rather at Nagul or Khalsee) to be picked and properly packed,—an operation which, from its cost, say 4 ans. per cwt. and the reduction in weight it would cause (at least one-third,) would enhance the price from 2-8 to rupees 3-10-8, and including the cost of one gunny bag per maund, at least 5 ans. more, or say in round numbers rupees 4, or 8 Rs. per maund, or 11*l.* 4s. per ton.

To this, carriage from Saharanpoor to Ghurmuktiser, or rather Sookerthal, a ghat twenty miles above Ghurmuktiser, at the minimum rate of 8 ans. per maund, and freight to Calcutta at no less than 1-4, including insurance, &c.; and we shall find the cost of the article delivered in Calcutta to be 5 rupees 12 ans. per maund, or 16*l.* 2s. per ton. The freight and expenses to London will not fall much short of 5*l.* thus allowing the Lichen to be delivered in London at 21*l.* odd.

The following is a rough guess of the proportions in which the other species I have sent might be obtained, from which it would appear that there would not be much difference in the cost of the several kinds.

Taking the Chulchelera as the criterion represented by the figure 1, I think the other species might be thus placed—

Everniæ species (? tenacissima)	...	...	$\frac{1}{4}$
Parmeliæ ditto	...	...	$\frac{1}{2}$
Usnea florida	...	...	...
Ramalinæ species (tree)	...	...	3

The species of Cladonia at not more than $\frac{1}{8}$, if so much.

This proportion of Course would only influence the original cost of gathering.

Dehlee, 4th October, 1841.

Proceedings of the Asiatic Society.

(Wednesday Evening, 6th October, 1841.)

Dr. J. J. HEBERLIN, Senior Member present, in the Chair.

The following gentlemen proposed at the last Meeting were ballotted for and duly elected as Members; viz:—

Honble. A. AMOS, Esq.

R. BARLOW, Esq.

C. G. MANSEL, Esq.

Ordered—That the usual communication of their election be made to the aforesaid gentlemen, and that they be furnished with the rules of the Society for their guidance.

Library and Museum.

Books received for the Library of the Asiatic Society at the Meeting of 6th October, 1841.

Royle on the Productive Resources of India, London, 1840, two copies, royal 8vo. 2 vols.

Report of the British Association for the advancement of Science for 1840, 8vo. 1 vol.

Proceedings of the Zoological Society of London, 1839, part 4th, 1 vol.

Hodgson's Illustrations of the Literature and Religion of the Buddhists, Serampore, 1841, ten copies, 10 vols.

The Oriental Christian Spectator, August 1841, vol. 2d, No. 8, second series, Bombay, pamph.

Transactions of the Zoological Society of London, 1840, vol. 2d, part 4th, 4to. 1 vol.

Transactions of the Royal Society of Edinburgh, 1840, vol. 14th, part 2d, 4to. 1 vol.

The Annals and Magazine of Natural History, including Zoology, Botany, and Geology, June 1841, vol. 7, No. 44, pamph.

Philosophical Magazine and Journal of Science, 3d series, vol. 18, No. 117 and 118, April and May, 1841, pamph.

Calcutta Christian Observer, October 1841, new series, vol. 2d, No. 22.

Yarrell's History of British Birds, London, 1841, part 25, pamph.

- Journal of the Bombay Branch Royal Asiatic Society, July 1841, No. 1, pamph.
 Calcutta Monthly Journal, August 1841, third series, No. 81, ditto
 Proceedings of the Royal Society of Edinburgh, 1840-1841, No. 18, ditto.
 Reports of the Council and Auditors of the Zoological Society of London, April,
 1840 and April 1841, ditto.
 Sear-Ool-Mutakh-Reen, (Persian,) 1. vol.
 Another Persian Book, "Heedayah," vol. 3d.
Books presented to the Library of the Asiatic Society by Mr. A. CSOMA.
 Histoire général des Huns, Paris 1756, tome 1ere. parties 1ere. et 2d, et tome 2d.
 4to. 3 vols.
 Dufresne Choix de Littérature, Edinburgh, 1808, Svo. 1 vol.
 Recueil ou Melange Littérature, &c. par A. Scott, Glasgow, 1803, Svo. 1 vol.
 Deodati Lettre d'une Peruviana, Londra, 1798, Svo. 1 vol.
 Journal of the Royal Asiatic Society of Great Britain and Ireland, London, 1834-
 35-36, Nos. 2, 3, and 5, 3 vols.
 Memoir of the Expedition of an Ecclesiastical Establishment, by the Rev. C. Buch-
 anan, London, 1805, 4to. 1 vol.
 Transactions of the Royal Asiatic Society of Great Britain and Ireland, London,
 1833-34, vol. 3d, parts 1st, 2d, and 3d, 4to. 3 vols.
 Ditto ditto, Appendix, 1 vol.
 The Religion of Reason and of the Heart, by Chas. Benhurini, 1 vol.
 Europe and America, or the Future Prospects of the Civilized World, by De S.
 Phiselduk.
 Râdjataranginî, ou Histoire des Rois du Kachmîr, traduite par M. A. Taylor, Paris,
 1840, in 2 vols. Svo. thirteen copies, 26 vols.
 Comptes Rendus Hebdomadaires des Séances de L'Académie des Sciences, tomes
 6e. à 10, 4to. 5 vols.
 Histoire des Mongols de la Perse, traduite en Français par M. Quatremère, Paris,
 1836, tome 1ere. royal folio, (2 copies,) 2 vols.
 Journal Asiatique, 3rd série, Paris, 1840, tomes 9 and 10, Svo. 2 vols.
 Recherches sur L'Ancienne Astronomie Chinoise, 4to. 1 vol.
 Brosset's Chronique Géorgienne, Paris, 1831, six copies, Svo. 6 vols.
 Nouvelle Suites a Buffon, Cours de Geologie, tome 2, et Planches, 2d Livraison,
 Paris, 1839, Svo. 1 vol.
 ——— Histoire des Végétaux Phanérogames, tomes 7 and 8,
 Paris, 1839, Svo. et Planches, 11 à 14 Liv. 2 vols.
 Dr. Walker's Histoire des Reptiles, tome 5, Paris, 1839, Svo. 1 vol.
 Ditto ditto, Planches, 5 Liv. 1 vol.
 ——— Histoire des Insectes Orthoptères, Paris, 1839, Svo. 1 vol.
 Ditto ditto, Planches, 1 vol.
 Geographie D'Aboulféda, Texte Arabe, Paris, 1840, 4to. 2d Livraison, (6 copies,) 6 vols.
 Y.—King, Antiquissimus Sinarum, &c. Svo. 2 vols.
 Dupin's Bien-Etre et Concorde des classes du Peuple Français, Paris, 1840, 12e.
 (two copies,) 2 vols.
 Bulletin de la Société pour l'instruction Elementaire, Juin-Sept. 1840, Paris,
 1 vol.

- Société pour l'instruction Elementaire, 4me Assemblée Générale, Paris, 2 vols.
Assemblée Générale, et Annuelle de la Société de la Morale Chrétienne, Paris, Mai 1840, (2 copies,)
- Procès-verbal de la Séance Générale de la Société Asiatique, du Juin 1840, (six copies.)
- Coup D'Oeil sur la situation de l'instruction primaire en France, par M. Boulay de la Meurthe, Paris, 1840.
- Ville de Paris, Rapports et conclusions de la Commission des livres et Methodes, Année seculaire, 1840-41, 4 pamph.
- Rapport sur la 3rd édition du Manuel des Ecoles Elementaires, &c. par M. Sarazin, Paris, 1840, (2 copies,) ditto.
- Journal de Médecine et de Chirurgie Pratiques, 9th Année, Paris, tome 9, 1 Cahier, Janvier 1838, ditto.
- Echo de la Litterature et des Beaux Arts, Novembre 1840, Paris, ditto.
- Epistemonomie ou Tables generales d'indications des Connaissances Humaines, Bruxelles, 1840, ditto.
- Extrait des Annales de la Societe Sericicole, 1840, Paris, 2 copies, ditto.
- Catalogue de la Librairie D'Ab. Cherbulliez et Cie, a Paris et a Geneve, ditto.
- Calcutta Christian Observer, new series, vol. 2d, No. 23, November 1841, ditto.
- List of the Geological Society of London, 1841, ditto.
- Journal des Savans, Janvier, Fevrier, et Mars, 1841, 3 vols.
- Jaubert's Geographie D'Edrisi, tome 2d, Paris, 1840, 4to. 1 vol.
- Transactions of the American Philosophical Society, new series, vol. 7th, parts 1, 2, and 3, Philadelphia, 1841, 4to. 3 vols.
- Freytag Hamasæ Carmina, textus Arabici, Bonne, 1826, 4to. 1 vol.
- Reid on the Law of Storms, with Charts, London, 1838, royal 8vo. 1 vol.
- Edinburgh New Philosophical Journal, by Professor Jameson, January to April 1841, No. 60, 1 vol.
- Farmer's Cabinet, devoted to Agriculture, Horticulture, and Rural Economy, 4th August 1839 to July 1840, Philadelphia, 8vo. 1 vol.
- Calcutta Monthly Journal, for September, 1841, 3d series, No. 62, 1 vol.
- Oriental Christian Spectator, September and October 1841, vol. 2d, Nos. 9 and 10, 2d series, 2 vols.
- Proceedings of the American Philosophical Society, vol. 1st, Nov. and Dec. 1840, No. 14, and vol. 2d, Jany. Feb. March 1841, Nos. 15, 16, 17, (2 copies each,) pam.
- London, Edinburgh and Dublin Philosophical Magazine and Journal of Science, 1841, vol. 18th, No. 119, and Supplementary Number 120, and vol. 19th, No. 121, 3 vols.
- Proverbia Arabica, edidit G. G. Freytag, Bonne ad Rhenum, 1838, 2 vols.
- Proceedings of the Geological Society of London, 1840-41, vol. 3d, part 2d, Nos. 72 to 75.
- Forbes on the Ancient Languages of Gaul, Britain, and Ireland.
- Freytag Darstellung der Arabischen verskunst mit sechs Anhaengen, Bonne 1830, 1 vol.
- Histoire Naturelle de Poissons D'eau douce de l'Europe Centrale, par Lieut. Agassiz, Planches, 1 vol.

Elliott's Carnatic Inscriptions, MSS. 2 vols.

Freytag's Chrestomathie Arabica Grammatica Historia, Bonne, 1834, vol. 2d, and 1st, chapters 7 to 14, vols.

Freytag's Liber Arabicus seu Fructus Imperatorum et Jociatio ingeniosorum, Bonne, 1832, 4to. 1 vol.

Dastoor-Ool-Aunwar, (Persian,) 1 vol.

Kittāb Mat-Laol-Audda-en, 1 vol.

Read letter from JAS. CRICHTON, Esq. Colonial Surgeon, with a box of Insects from Western Australia.

Read letter from H. B. HINTON, Esq. Civil Surgeon, Akyab, with six Geological Specimens for the Economic Department of the Asiatic Society.

(To these, reference has been made in the Curator's Report.)

Read Memorandum on the organization of a Museum of Economic Geology for the North-Western Provinces of British India, submitted by Lieut. BAIRD SMITH, of the Engineers, agreeably to the request of the Society.

Ordered—That a copy of the Memorandum be forwarded to Government, and the original made over to the Secretary for publication in his Journal.

Read letter from Mr. H. COPE, of Mussoorie, offering his services for the collection of Lichens, for the purpose of assisting the researches set on foot by Mr. FRIDINGTON, for the extraction of colouring matter from them.

Read letter from Mr. Secretary BUSHBY, of 15th September 1841, intimating that the Resident of Indore had been written for information respecting the Nurma Cotton, and for specimens of the seeds and soils, and that a communication would be also made to the Lieutenant Governor at Agra, that reference may be made to the Sudder Board of Revenue at Allahabad, and to Mr. BRUCE of Bundelcund, who is stated to be well acquainted with the Nurma Cotton of Malwa.

Report for the Month of September, by the Curator.

ANIMAL KINGDOM.

“The arrival of two large and double glazed cabinets in the Museum, for the reception of the stuffed specimens of Mammalia, at the time of my taking charge of the Society's collections, has occasioned me to bestow more particular attention on this department, during the brief period that has elapsed since I assumed the duties of the Curatorship, and I have accordingly inspected and properly arranged what few specimens there as yet exist illustrative of the living Mammalia of India, and have labelled every species with its synonyms, so far as I have been successful in determining the latter.

“With the important accessions in this class with which the Museum has been enriched during the past month, the entire number of species of which we possess some portion, more or less, amounts to 147. There are eighty stuffed specimens, pertaining to 64 species; and seven other species may be considered as temporarily represented by imperfect skins; indeed, many of the former require exceedingly to be replaced

by better specimens. The number of perfect skeletons is 28, comprising several large and valuable species; besides which, we have nearly all the bones of the Malayan Tapir, and of a large species of Whale, with a few belonging to some other species: of skulls, there are examples of fifty-four species additional to the thirty represented by the entire (or nearly entire) skeleton; and the remainder of the collection consists of a few specimens of Bats, and one of the Sylhet Mole, preserved in spirits, the frontlets and horns of various Ruminants, and a few specimens of tusks and other parts, being all that we possess of their species, and comprising those of the Narwhal, Hippopotamus, Phacochoere, the molars of the Cachalot, &c.

"It will interest Zoologists in Europe to be informed that the spoils of the identical specimen of the Sumatran Orang-utan described by DR. CLARKE ABEL in the 15th Volume of the "*Asiatic Researches*," and to which so gigantic a stature has been ascribed, are still preserved in our Museum, in so favourable a condition that I have even had the skin cleaned and mounted, which has enabled me to examine the specimen minutely, and to ascertain positively the fact of its possessing the same cheek-callosities as the great Bornean Orang-utan; the omission of DR. ABEL, to notice this conspicuous and unsightly feature in his elaborate description of the specimen, has induced a suspicion that the remarkable character in question would prove not to exist in the Orang-utan of Sumatra; nor was I able to satisfy myself of the presence of the callosities until the skin of the face was moistened and rendered pliable, when they became conspicuously apparent. This will account for their not having been remarked by DR. ABEL, as that naturalist took his description from the dry skin, as I first saw it. The individual being merely adolescent, the callosities on the cheeks had not attained the frightful extent of development figured by M. TEMMINCK, in the instance of the fully mature Bornean Orang; nor had its beard grown to nearly so great a length. With regard to the size of the animal, the statement of Capt. CORNFoot, that "he was a full head taller than any man on board (his ship,) measuring seven feet in what may be called his ordinary standing posture," (*As. Res.* xv, 493,) is an exaggeration to which I can only wonder that DR. ABEL gave publicity; the length of the body, from shoulder to ham, could never have exceeded two feet and a half, and I suspect was even some inches less; and the animal was thus by no means of the largest size, nor probably quite full grown. I can perceive in it no external difference whatever from the great Bornean Orang, and consider them to be very decidedly the same in species; nevertheless, in the only portion of the skeleton of DR. ABEL's Sumatran specimen which the Society possesses, namely, the lower jaw, there is a very remarkable difference in form from the lower jaw of a male Bornean Orang of similar age, also in the Museum;—the ascending portion of the jaw being half an inch less broad, while the alveolar portion is considerably deeper, especially in front, and the chin more slanting. I shall take an opportunity of recurring to this subject on another occasion. That individual variation of form occurs, to a considerable extent, in certain details in skulls of the Orang-utan, is now, I believe, generally admitted by those who have had opportunities for observation.

"Considering how many years the valuable specimen which I have been noticing has been exposed to the destructive influences of an Indian climate, hanging from the wall of a room, it is consolatory to find that it is in no respect much injured by such exposure, while it encourages me to hope that, with proper care and attention, the

mounted skins of animals in our Museum may be preserved for an indefinite period, with little more than the same protection which such specimens receive in Europe.

"Of the next genus, that of the Gibbons (*Hylobates*), two highly interesting fresh specimens have been presented by the Right Hon'ble the Governor General, which had died in the park at Barrackpore. One of these is a half-grown female of the Hoolock, or White-browed Gibbon, (*H. Hoolock*, Harlan, *H. Scyrites*, Ogilby, and the brown variety *H. Choromandus*, Ogilby). The specimen is in beautiful condition, and if any doubt could exist of the specific identity of the *H. Scyrites* and *H. Choromandus* of Mr. Ogilby, the present individual would remove that doubt, from the intermediateness of its colouring. The other specimen is a still younger female, also in admirable *pelage*, of the White-handed Gibbon (*Simia Lar*, Linnæus, but not *H. Lar* of Vigors and Horsfield, which applies to *H. Agilis*; *H. Albimana*, Vigors and Horsfield, *S. Longimana*, Schreber, and the brown variety—*Pithecus Variegatus*, Geoffroy, but not *H. Variegatus* of Müller, which refers to *H. Agilis*.) The colour of this specimen is a very pale yellowish brown, and every intermediate shade between yellowish white and deep-black is exhibited by the species, in common with the greater number, if not all, of its congeners; the circumference of the face and the four hands being white invariably. This species of Gibbon is generally brought from Singapore, and according to the most trustworthy information, is unknown in Sumatra, Java, or Borneo, in each of which islands it is represented by a nearly allied species, respectively peculiar to the island, viz. by *H. Agilis* in Sumatra, *H. Leuciscus* in Java, and *H. Concolor* of Müller in Borneo; whether the last-mentioned is identical with the *H. Concolor* originally described by Harlan, remains to be determined: the present specimen was brought from Moulmein; and it is doubtless the species referred to by the late Dr. Helfer in Tenasserim, as being "the most common species of its genus in the interior, howling most piteously in the solitary forests:" that gentleman also mentions the Siamang (*H. Syndactylus*), as having "been found in the southern parts of Tenasserim, up to the 15th degree of north latitude;" a statement it would be desirable to have confirmed, as this animal was previously supposed to be restricted to Sumatra. Finally, to complete this brief notice of the Gibbons, the remainder consist of the Hoolock upon the hills of Assam and Arracan, and the White-cheeked Gibbon, (*H. Leucogenys*, Ogilby), a species lately characterized from a young individual in the possession of the Zoological Society, and the habitat of which was unknown. My friend and fellow-passenger, Lieut. Beagin, however, of the 2nd Madras Cavalry, recognised the drawings which I possess of this species, as decidedly representing one which he had often seen upon the Malabar ghauts, and forests of the Neelghierries, and which varies as much in shade of colour as the others (the Siamang, perhaps, alone excepted, which has never been observed otherwise than black.) Mr. Beagin had seen and handled a freshly killed specimen of the full-grown male, which taking it under the arms required considerable exertion to lift; the height was about three feet. Speaking on this subject to Mr. Walter Elliott, that naturalist remarked to me, that he had never heard of such an animal in those parts; but Mr. Ogilby, in his treatise on the Apes, (published in the Library of Entertaining Knowledge), states, "We have heard from an officer of high rank and celebrity that there is unquestionably a real Ape in the forests of the Malabar coast: he had often heard the natives speak of it, and not unfrequently heard its cry, *wow-wow*,

in the woods, though he had never actually seen it." Of all these species of Gibbon, it is highly desirable that the Society should possess a good series, illustrative of the principal variations of colour; at present we possess but four specimens, namely the Hoolock just mounted, and a young one in bad condition; and a black specimen of the Lar, which contrasts remarkably with the almost white example that has been just set up. The kindness of Dr. Walker enables me to exhibit an equally pale specimen of the Hoolock. I have had the skulls of all four taken out, and the entire skeleton of the new Hoolock is in course of preparation. I have saved also the *cæcum* with its small *appendix vermiforme* of this specimen. It should be remarked that the individual of *H. Lar* here noticed, possessed 13 pairs of ribs, whereas Daubenton, as quoted by all subsequent writers, found but 12 pairs in the specimen dissected by him. (Vide Buffon, *Hist. Nat.* xiv. 104.)

"When at Madras, two packages of skins were entrusted to my charge, for the Society, the one a donation from Dr. Coles, and the other from David Ross, Esq. The former consisted entirely of those of Mammalia, procured in Travancore. Among them are some highly interesting specimens. Of the genus *Semnopithecus*, there are two species new to the Museum, which previously contained only a half-grown female of the Hoonuman, (*S. Entellus*.) One of these is referrible to the Hooded Semnote, (*Simia Johnii* of Fischer, *Sem. cucullatus*, Is. Geoff., and apparently also the "Leonine Monkey" of Pennant and Shaw.) The specimen is a female, nearly half-grown, but which had not begun to change its first dentition. It would seem to be this species which is indicated in the following passage, extracted from Dr. Harknesse's volume on the aborigines of the Neelgherry Hills, (p. 61.) That author notices—"A number of large black Apes, which kept up a continual rustling among the trees, and every now and then projected, from below the foliage, their grey-bearded visages, chattering, and apparently surprised at our intrusion."* I have been informed that it keeps always to the trees, and never, like the Hoonuman, resorts to houses; this I mention, because nothing has been hitherto published of the habits of the species. The other specimen, if not an entirely new species, is a finer example of the adult male *S. cephalopterus*, (*Cercopithecus latibarbatulus*, Desmarest, *C. leucoprymnos*, Otto, *Sem. fulvogriseus*, Desmoulins, *S. Nestor*, Bennett,) than appears to have been hitherto met with by naturalists. Indeed, it differs so much from all the descriptions I have seen of the latter, and from the figure supplied by Mr. Martin, that I much suspect it will prove to be new, in which case I would propose for it the appellation—*S. hypoleucos*.† This animal is nearly allied to the *Entellus*, but considerably smaller, the present apparently aged male measuring about twenty-one inches from crown to base of tail, the tail thirty-two inches, (which accords with the dimensions of *S. cephalopterus*.) The entire back and shoulders, together with the outside of the humerus and thigh, are of a rather deep and somewhat dusky brown, with a tinge of chocolate, becoming paler laterally, and having passed into white on the sides, under parts, and inside of the thigh and humerus; the face, ridge of hairs impending the brow, a few on the cheeks and lips, with the whole tail, and the remainder of the

* Vide a notice, also, in Dr. Royle's Illustrations of the Botany, &c., of the Himalaya Mountains, at the end of a note to p. 30, where the productions of the Neelgherries are adverted to.

† Since writing this, I have seen the *S. cephalopterus* alive in the park at Barrackpore, and can therefore pronounce on its distinctness from *S. hypoleucos*.—Cur. As. Soc.

limbs, deep black, mixed with whitish inside the fore-arm and in front of the leg; crown, occiput, sides of the head, or what are called the whiskers, together with the beard, brownish white, having a faint tinge of the hue of the body upon the vertex; the whiskers are not remarkably lengthened, though very copious, and do not stand out in the remarkable manner stated, as well as figured, of those of *C. cephalopterus*. All that I could learn of this monkey was, that it bore the name of the Travancore Monkey in Madras. The *S. cephalopterus* is only known to inhabit Ceylon.

“The remainder of Dr. Coles’ donation consists of the following specimens and species:—

Galeopithecus Temminckii,

Pteropus medius,

Taphozous brevicaudus, Nobis, (a new species, entirely distinct from another in the Museum, which again differs from *T. longimanus* of Hardwicke, the only Indian species as yet described,)

Sciurus maximus, (three specimens,)

—— *hippurus*,

—— *erythreus*?

Pteromys petaurista,

Gerbillus Indicus, and

Meminna kanchil, (a nearly white specimen from Malacca.)

“Of these it will be sufficient to remark, that the specimens of *Sciurus maximus*, with those previously in the Museum, illustrate the gradations of variation in colour to which this species is subject: while I may also mention that all the examples of genuine *Pteromys petaurista* which I have seen, whereof the habitat was known with certainty, were brought from Travancore;* though it is doubtless the same species of which Major Forbes gives so interesting an account in his ‘Journal of Eleven Years Residence in Ceylon:’ the allied *Pt. nitidus* comes always from the Malay Peninsula and Islands, and the *Pt. magnificus* from the Himalaya. The *Galeopithecus Temminckii* is entirely distinct from the species inhabiting the Phillipines, as lately shewn by Mr. Waterhouse.

Mr. Ross’s donation consists almost entirely of Birds, but contains three skins of Mammalia, and one Reptile; viz:—

Pteropus medius? (most probably distinct, but I wait for further data before deciding,)

Megaderma tyra,

Herpestes griseus; and the Reptile,

Varanus binotatus (*Lacerta binotata*, Kuhl.)

The following are the Birds:—

Upupa Epops,

Alcedo Bengalensis,

Halcyon Smyrnensis,

Merops Phillipinensis, (adult and young,)

Coracias Indica,

* The Society has since received this species from Moulmein: and the *Pt. Oral* of Lt. Tickell, (described in the *Calcutta Journal of Natural History*, No. 7, p. 401,) would seem to be no other.—Cur. As. Soc.

Bucco Indicus,

Eudynamys orientalis, (male and female, remarkable for the great sexual diversity of plumage,)

Centropus pyrrhopterus,

Lanius Hardwickii,

Lanius minor ?

Copsychus saularis, (Wagler,)

Hæmatornis, (Swainson,) a species nearly allied to *H. Caffer*, but much smaller, having the upper parts, with the hind-neck and breast, of a hair-brown colour, slightly fringed (as in *H. Caffer*) with greyish, and the under-parts dull-white, mixed with brown anteriorly; in other respects a miniature of *H. Caffer*: entire length 6½ inches; of wing 3½ inches; tail 2½ inches; tarse ¾ inch, and bill from forehead ½ inch. Should it be undescribed, I propose for it the appellation *H. pusillus*.

Pitta brachyura,

Oriolus aureus,

Euplectes Phillipensis,

Pyrgita Domestica,

Cinnyris Mahrattensis, (two specimens,)

— *sola,*

Perdix Argoondah, (male and female,) *Coturnix Argoondah,* Sykes,

Hemipodius pugnax,

Glareola torquata,

Tachydromus Asiaticus,

Parra Sinensis, (adult and young,)

Himantopus melanopterus.*

"I have also to acknowledge the donations of a fresh-killed specimen of *Pteropus medius* from Mr. J. J. Maclean; of a fine Alexandrine Parroquet, (*Palæornis Alexandri*), from Mr. L. Swarries; of a Bat, (*Scotophilus castaneus*), from Mr. Bouchez; and two young Bats, of a species nearly allied to the European *Pipistrelle*, have been picked up in the compound surrounding the Museum.

A large box of Insects, collected in the Australian settlement of Swan River, has also been presented to the Society by Mr. Crichton of that place, containing many interesting specimens, and especially valuable for the number of duplicates comprised, the importance of which, properly distributed, need not be further adverted to. The collection contains 287 specimens, referrible to about 80 species, and the *Coleoptera* outnumbering all the other orders. A considerable number of native insects have been taken by a person I have employed for the purpose.

"In the Osteological department, the skeleton of the Rhinoceros, which was much soiled and badly set up, has been taken to pieces, cleaned, and is now in process of being remounted. Several small skeletons are also in course of preparation, and some skulls have been added to the collection. A skin of the Yak, (*Bos grunniens*), which,

* The whole of these specimens were collected in the Zillah of Chingleput, as Mr. Ross has since informed me.—Cur. As. Soc.

for five years, has been hanging to the wall of one of the apartments, I have had moistened and stuffed, and the skull, which was wanting in the collection, taken out and cleaned. The mounted skin now forms a very good specimen of the stuffed animal.

MINERAL KINGDOM.

But a single donation has arrived during the past month in this department, consisting of six specimens, presented by H. B. Hinton, Esq. for the Museum of Economic Geology; viz:—

- One example of Granite Rock in the Ganges at Puturghat,
- One of Hornblende, from Sicrigully, Rahjmahel,
- Trap, called Whinstone by Buchanan, from the same locality,
- Kunkur, ditto,
- Quartz, 'fat and mealy,' ditto, and
- Iron, ditto.

"Lastly, Dr. Lloyd has sent for deposit in the Society's Museum, a Deep Sea Clam and Cylinder, of which every care will of course be taken."

The Secretary, before reading the foregoing report of the Curator, (Mr. BLYTH,) took occasion to introduce him to the meeting, and proposed that the services of Mr. PIDDINGTON, late Curator, be suitably acknowledged.

The best thanks of the Society were accordingly accorded to Mr. PIDDINGTON, for his valuable services during the time he officiated as Curator, and hope expressed that he would continue to afford his services in the good cause which he has as much at heart as the Society, to promote.

Read a proposal from Molovi Abdoollah to reprint in Persian, the "*Hedayah*," and soliciting the patronage of the Society for the undertaking, by their subscription for 100 copies.

This proposal not coming within the province of the Society, it was proposed by Dr. HÆBERLIN, and seconded by the Secretary, that the Society subscribe for five copies, as an encouragement to the Molovi for his undertaking.

The proposal having been put to the vote, it was lost by a shew of hands: ordered, therefore that the proposal be declined, and the Molovi informed accordingly.

Read letter of 1st October 1841, from Dr. HÆBERLIN, submitting his reasons for proposing that Professor H. EWALD, of Tübingen in Wirtemberg, be elected an Honorary Member of the Asiatic Society of Bengal.

Read report from the Secretary and Officiating Curator of the Society of the 18th June last, with correspondence on the subject of the Geological Collections of Capt. HUTTON.

Ordered, that the subjects of two foregoing papers be submitted to the Committee of Papers for consideration and report.

Read the following report from the Librarian for July last:—

SIR,—I have the honour of transmitting to you my report of last month, requesting you to lay it before the Committee of Papers.

It was highly encouraging to me, that the plan which I had the pleasure of proposing for a new arrangement of the Library and Catalogue met, in its general features the approbation of the Committee.

In compliance with their request, I now beg to state what progress has been made in the new arrangement during the last month, premising, that it was commenced on the 19th ultimo, when I received a communication from you concerning the resolution of the Committee.

The classification adopted for the Classic Literature, is as follows :—

I.

CLASSIC LITERATURE.

1.

Greek Literature.

A. Philosophy,

B. History,

C. Geography,

D. Miscellaneous Works.

2.

Roman Literature.

This division of the new catalogue has been completed, and the books of the Library referring to it, have been arranged accordingly.

The classification of the second division is also commenced, and the works, belonging to its first head, viz. Theology, have been entered into the catalogue; the arrangement has proceeded to the heads of Jurisprudence, Medicine, and Philosophy.

The following is the classified arrangement of Theology :—

II. Literature of modern times from the commencement of the Christian æra to the present age.

I.

Theology.

A.

Polytheism.

A

B

Special forms of Polytheism in general.

a. Religion of Egypt.

b. ——— of Greece and Rome.

c. ——— of Zoroaster.

d. Brahmanian.

e. Buddhism.

f. Religion of Confucius.

B.

Monotheism.

A

B

Judaism. Christianity. Muhammedanism.

a. Holy Scriptures and their parts.

b. Biblical Criticism and Interpretation.

c. History of the Christian Church.

d. Miscellaneous Works.

C.

Pantheism.

C

I beg to observe with regard to this classification, that the subdivisions have of course been made according to the number of works in the Library, as a complete arrangement cannot be made, except there be a number of books sufficient to represent the co-ordinate divisions of a branch of Literature.

I add two lists which have been prepared during last month for the consideration of the Committee, one of all the defective works in the Library, specifying the volumes which are wanting, as many of these works contain the most important information about subjects intimately connected with the purposes of the Asiatic Society, which renders it very desirable to have them completed.

The second contains the number of books which require to be rebound. With regard to them I would observe, that though the expense of putting them into good condition, may be considerable, the preservation of so many excellent works will justify the outlay; for should they be allowed to remain in their present state, most of them will soon be so far destroyed as to be of little or no service in the Library.

Should the Committee resolve to have these books rebound, I would take the liberty to suggest, that several respectable Book-binders be requested to send in their estimates. I would also remark that, when books, requiring to be bound, are many, as for instance in a Public Library, the prices ought to be something less than the common rates.

The rate for the binding of books, as fixed at present, appears too high, as the accompanying list of the respective rates apparently shews.

11th August, 1841.

I have the honour to remain, Sir,

Your obedient servant,

E. ROER.

Read report by Mr. PIDDINGTON, on the Cylinder found on the hills near Herat, and presented to the Society by Major E. POTTINGER, which the Secretary informed the Meeting he would print in an early number of his Journal.

Read letter of 1st September 1841, from Lieut. A. CUNNINGHAM, of which the following is a copy:—

MY DEAR TORENS,

Lucknow, 1st September.

The Silver Plate of which you have got 500 lithographed copies, appears to me to represent most unquestionably the portrait of Sapor II. or Shahpuhr Zu'l Aktaf, or Zu'l Aknaf; for in the list of the Sassanian Kings, whose dresses are described in the *Majmul-ut-Towarikh*, I find that he is the only one who has a crescent on his crown. His dress is thus detailed, a rose coloured tunic; red pantaloons; a crown of blue and gold, embroidered in different colours, surrounded by two circles of gold, and ornamented with an embroidered crescent.

Do you think then that *Zu'l-Afkun*, or "Lord of the Lion," might be substituted for *Zu'l-Aktaf*, "Lord of the shoulders"; and *Zu'l-Akna'f*, "Lord of the wings?" The last of these is supported by the wings, which appear on the head-dress of so many of the Sassanian Princes?

Yours sincerely,

A. CUNNINGHAM.

For the Contributions and Presentations thanks were accorded.

JOURNAL

OF THE

ASIATIC SOCIETY.

Report on the Tin of the Province of Mergui. By Captain G. B. TREMENHEERE, Executive Engineer, Tenasserim Division.

1. The tin of this province has not been sought for since the Burmese took possession of the country from their Siamese neighbours. Under the rule of the latter, or during the period at which Tenasserim was an independent state, extensive works for tin were carried on. It occurs chiefly in the beds and banks of streams issuing from the primitive mountains, which form the principal feature of this peninsula ; portions of the banks of streams in which it is found are, in some instances, rivetted with rough stone-work, to confine the water for washing operations ; and the ground on either side, for many miles along their course, is penetrated by innumerable pits, from eight to ten and twelve feet deep. Traces of the work of many thousands of men are evident in several places. These pits are not connected with one another, but seem to have been sunk by separate small parties of men, to whom probably definite tasks were assigned, with a view of tracing the tin ground, and of extracting the gravel with which the tin is mixed.

Their variable depth, and the amount of labour expended on them, is a tolerable indication of the success with which this has been pursued, and of the places in which ground might be again perhaps opened with advantage.

2. The streams themselves are rich in tin, which may be collected from their beds in considerable quantities. The process by which it has been deposited for long periods, and for many miles along

the line of valleys through which they flow, appears to be in active operation at the present day. Crystals of the peroxide of tin washed down by the rivers, and deposited with sand and gravel in their beds, may, by changes of the river's course during the freshes, be quickly covered with a few feet of gravel and soil. The older deposits have, as far as my observation extends at present, the same alluvial character, and it would be well in future operations to have regard to the levels in which the streams may have formerly run.

The first of these localities which attracted my attention, was the Thengdon river, issuing from the primitive mountains in the immediate neighbourhood of the coal mine on the Great Tenasserim river. I visited this river in the course of my survey of the coal basin, and found pits in great number along its banks, of the existence of which I had been previously informed, though the object for which they had been dug was not known to my informant. On washing some of the gravel from the bottom of one of the pits, a small quantity of tin was found.

3. A Shan was subsequently sent there, and collected 11,889 grains of tin of the native peroxide in the course of an hour and half. Specimen No. 1, which is equivalent to 19 ounces and 198 grains of pure tin.

4. After leaving the vicinity of the coal mine, I proceeded down the river, and was accompanied by the Shan, who had been employed in tin works in the Straits, and to whom several tin streams in the Mergui province were known. These are situated chiefly on the Little Tenasserim river, into which they empty themselves. The first and most accessible is the Thabawlick, which unites with the Thakiet three miles above the junction of the latter with the Little Tenasserim. The mouth of the Thakiet is eleven miles from the town of Tenasserim.

5. The access to this tin ground is by land in the dry season. Landing at the village of Thakiet, I proceeded on foot eight miles, and reached the Thabawlick, at the point indicated in the accompanying sketch.

6. The intervening ground is for the most part flat. After passing a marsh of some extent, there is a low ridge of hills, which presents, however, no obstacle to land carriage of any description. The face of the country is, as usual, except in marshy places, thickly covered

with jungle trees ; but the wild elephants' tracks are open and convenient. During the monsoon, boats carrying 100 bags of rice, can ascend the Thabawlick to the place alluded to, in one day. The tide is felt about six miles from its mouth.

7. Having arrived at the spot at a point known to my guide, and at which he had the previous year stationed himself for a few months, for the purpose of collecting tin, I found numerous pits and old cuttings, from which tin had been formerly obtained. It is found in layers of gravel immediately beneath the soil. The surface is undulating, and during the wet season, streams of water could have been conveniently conducted near the excavations, for the purpose of washing the gravel.

8. The guide stated, that crystals of tin could be in this manner separated by the hand without the usual aid of the washing trough. The rains not being at that time sufficiently advanced for that purpose, I did not succeed in obtaining any tin from the pits. The line of deposit of the richest stanniferous gravel has been probably influenced by many causes, and the chances of finding it are much the same as those to which other undertakings of this nature are subject. A few trials, however, across the low ground through which the hill streams pass, would enable the speculator to follow its course.

9. The time of the tin washer was, I found, much better occupied in seeking for tin in the bed of the river. He was assisted by one man, who disturbed the sand and gravel with his feet to as great a depth as he could thus accomplish, when a conical and shallow trough, about two feet in diameter and ten inches deep, was filled with the same, and washed in the stream by a circular motion, so as to get rid of the gravel and lighter particles, leaving the crystals of tin to collect, by their gravity, on the apex of the hollow trough. Each filling and washing occupied, on an average, six minutes.

One washing produced 1041 grains of native peroxide of tin in six minutes.

Specimen No. 2, equivalent to 1 oz. 335 grains of pure tin.

One do. do. 1265 grains of do. do.

Specimen No. 3, equivalent to 2 oz. 31 grains of pure tin.

One do. do. 1785 grains of do. do.

Specimen No. 4, equivalent to 2 oz. 430 grains of pure tin.

One hour's work apart from the above, 8,166 grains of pure tin.

Specimen No. 5, equivalent to 13 oz. 160 grains of pure tin.

Total of half a day's work, including the above, 25,406 grains, equivalent to 2 lb. 9 oz. 232 grains of pure tin.

Specimen No. 6, contains of the latter, 13 oz. 149 grains.

The price of labour in this province is 6 annas per day.

10. The produce of a day's labour of two men would be, according to the above trial, equivalent to 5 lb. 2 oz. 464 grains of pure tin, at the cost of 12 annas, exclusive of the expenses of reduction to the metallic state. This process, from the pure state of the mineral, is extremely simple and inexpensive. The tin collected in the trough would require one more washing to remove particles of sand, &c. and charcoal is the only fuel required for its reduction.

The pieces or ingots of tin in the shape of the frustrum of a cone, (Specimens Nos. 7 and 8,) which are manufactured at the Rehgnon mines, on the Pak Chum river to the southward, and exchanged there for goods at 4 annas each, weigh 1 lb. 2 oz. 383 grains; and their value at Mergui, where the average price of tin is 85 rupees per 100 viss, of 365 lbs. 4 annas 4 pie. The value therefore of 5lbs. 2 oz. 464 grains, or the day's work of two men, would be 1 rupee 8 annas 4 pie. The cost of collecting being 12 annas, leaves 12 annas and 4 pie for the cost of the reducing process, and for profit on the labour of two men.

11. On the morning after reaching the Thabawlick, I traced the tin ground for a mile in a N. N. E. direction. The pits are in some parts more abundant than in others; and I was informed that they occurred and were thickly scattered throughout the entire course of the river between that point and the hills from which it issued, at the distance of an entire day's journey, if the windings of the river are followed.

12. The pits have not been worked since the Burmese took possession of the country. At the head of the stream, there are said to be the remains of bunds constructed for distributing water for washing the tin, and the posts of a house still standing, which is supposed to have been occupied by a Siamese superintendent of the work there carried on.

The season was too far advanced to enable me to prosecute my inquiries towards the hills on this occasion, and my attention was

therefore confined to the spot from which I obtained the results detailed above.

13. Four other rivers emptying themselves into the Lesser Tenasserim, are said to produce tin, but none are so accessible as the Thabawliak.

The following are the names of these streams, with their distances from the Thakiet river :—

The Khamoungtang River, one day by the Little Tenasserim, and one march inland.

Engdaw River, no road through the jungle.

Kyeng ditto, two days by the river, and two days inland.

Thapyn ditto, three days by the river, and one march inland.

From the Khamoungtang specimen, No. 9, weighing 2,890 grains, was collected in ten washings, but I did not visit the place myself.

The size of the tin is larger than that collected in other places, though the produce is not equal in quantity.

14. After returning to Tenasserim, I visited Loundoungin River, where tin was said to exist, but it turned out to be Wolfran sand, which had been washed down from the adjoining slate mountains, and was lying on the surface of the sandy bed of the stream.

15. In proceeding down the Great Tenasserim River towards Mergui, I halted at Moetong, for the purpose of visiting a tin ground which was said to exist near the range of hills to the N. E. skirting the open plain in which this place is situated. On penetrating to the hill itself, I found it to consist exclusively of granite, with not a trace of another rock of any description. The dry beds of the water-courses consisted of granitic sand alone.

There were many excavations for tin on the face of the hill. Several loads of gravel from the bottom of the pits and from the beds of the water-courses were carried to the river and washed, but the out-turn of tin was very small. There is no water within convenient reach.

16. The next spot visited was Kahan, a small hill near the Zedavoun Pagoda, on the right bank of the Great Tenasserim River, 11 miles from Mergui. The tin occurs here under conditions differing much from that of the localities above mentioned.

Kahan itself is the highest portion of a low ridge of hills, not more than 200 feet above the level of the river: it is composed of a soft,

friable, white sand-stone rock, the upper portions of which are decomposed and irregular. The surface gravel does not contain tin. It is found in the crystallized form, interspersed in decomposed granite, forming a vein about three feet wide, which is enclosed by the white sand-stone rock, and dips down at a high angle with the horizon. Specimen No. 10, if its form be preserved, illustrates well the tin crystals imbedded in the decomposed granite, which are easily detached from the matrix. The Specimen No. 11, from the same vein, of a yellow colour, is considered the surest indication of the presence of the mineral, and lies below the white, No. 10. Large scales of chlorite occur with it, which as they are generally found where the tin is most abundant, is called by the natives the mother of tin. The face of the hill is in one spot scattered over with these, which appear to have been brought down from the vein, with other matter from which the tin has been separated by the usual mode of washing. It will be noticed, that the granite is completely decomposed, and that the crystals would be easily separated by washing. No tin has been raised here since the country came into our possession, but the locality has been known. It was worked during the Burmese rule, and valued as supplying the richest ore of tin. A Burmese residing near the spot, pointed out the place where his operations had ceased. He had followed the direction of the vein alluded to, as well as he was able, and had driven a gallery underground in an inclined direction upwards, till the bank above fell in, when the mine was abandoned. He stated, that he had procured considerable quantities of tin daily, and that he often found it in large masses mixed with the yellow ground above mentioned. Arriving at the spot where his work had terminated, I set people to excavate and find, if possible, the vein which had been described. It was reached after about two hours digging, at the depth of five feet from the surface of the cut in the hill, in which we stood. In about a quarter of an hour, a few baskets of the decomposed granite were removed down the hill, from which 3,900 grains of the crystallized peroxide of tin, equal to 63,176 grains of pure tin, Specimen No. 12, were collected; and the next day 23,400 grains, equal to 2 lbs. 6 oz., and 100 grains of pure tin were found in the same manner by one man's labour in excavating; one carrying down to the water, and a third washing.

17. This locality appears to be of very promising description, and I have little doubt that if the work were aided by ordinary skill and means, that a tin mine here would be productive. A vein of tin is, in fact, exposed to the day, and would only require for a considerable period of work the precaution of well-supported galleries and shafts, to allow of its contents being easily extracted.

The Kahan hill is, I conceive, an indication of a valuable repository of tin. It is but a quarter of a mile from the creek communicating with the river, which is accessible to any boats. Its proximity to Mergui, offers also great facility for the procuring of labour and supplies.

18. The localities, therefore, which appear to hold out the best prospects for tin are, first, for stream tin, the Thabawlick river and the Thengdon river; and for mine tin, the Kohan hill. They all produce tin of the same nature and quality; viz. crystals of the native peroxide, being a combination of oxygen and tin only.

19. No difficulty would be found in procuring labour from Mergui for carrying on tin works at either of these places.

20. The location of the coal mine on the Great Tenasserim river has given rise to much additional cultivation along the banks of that river, where there are many Kareen villages, from which parties on the Thengdon could be supplied. Fruit trees, not indigenous to the place, and other traces of a considerable population having once occupied its banks, are observable on this river. The banks of the Little Tenasserim are thinly occupied by Siamese villages. The country in this direction, except near the banks of the river, is utterly unpeopled, and appears always to have been so.

21. Communication by water from the Thakiet to the Thabawlick tin ground, is not open in the dry season, but the distance by land is short. The produce of two lines of country, that of the vicinity of the Great and Little Tenasserim rivers, passes the town of Tenasserim at the junction of these rivers, only 11 miles from the Thakiet, and no difficulty in procuring subsistence for working parties on the Thabawlick need be apprehended.

(Signed) G. B. TREMENHEERE,

*Capt. Executive Engineer,
Tenasserim Division.*

Report on the Manganese of the Mergui Province. By Captain G. B. TREMENHEERE.

1. During my stay at the Tenasserim coal basin, a piece of manganese ore (black wad) of good quality, was brought to me by a Kareen, who stated that it had been found accidentally in the bank of a stream called the Thuggoo, which enters the Great Tenasserim, seventeen miles below the coal site. Subsequently, several other pieces of the same ore were brought by Mr. T. A. Corbin, Assistant to the Commissioner from the Therabuen river, five miles above the Thuggoo, and from an intermediate spot, the locality of which had been previously known, and had been, I believe, originally pointed out by Lieut. Glover, of the Madras Army.

2. In proceeding down the river, I visited these spots, and found at each that a valuable bed of manganese ore existed close to the surface of the country. It had been apparently cut through by the action of the streams and river before mentioned, leaving a section of the bed of ore in their banks covered only by the debris of the banks themselves. Large quantities might have been carried away, but a few hand specimens only were taken, which sufficiently shew the nature of the deposit, and are fair samples of what might be easily collected.

3. The best Specimens, No. 1 and 2, are from the Thuggoo river and the bank of the Great Tenasserim. That of the Therabuen did not appear to be at the surface of so pure a quality, but the existence of the bed being known, it is perhaps premature to pronounce it an inferior ore, from the examination of specimens taken from a hole extending not two feet into the bank. No. 5 is a portion of manganese rock projecting into the Great Tenasserim river, near the mouth of the Therabuen stream.

4. For the localities above mentioned, I must refer to the sketch accompanying my report on the tin of this province recently forwarded.

5. Of the extent of these manganese beds, it is difficult to pronounce. The face of the country in which they are situated is flat, thickly overspread with soil, and with the densest jungle. It is not, as far I could perceive, intersected by many streams, which would afford

the means of tracing the mineral deposit. The Great Tenasserim river has passed through the manganese bed in one spot $2\frac{1}{2}$ miles removed from two other points at which it occurs to the north and south, at both of which it is likewise discovered near the surface by the action of the streams Thuggoo and Therabuen, the probability therefore is, that it is an horizontal deposit, covering many square miles. But without indulging in conjecture, there is sufficient at the localities referred to, to indicate large quantities of manganese ore, which could be collected by penetrating through the soil lying above it, and immediately near the spots in which it is now exposed to the day.

It occurs in the form of the black oxide, and is the manganese of commerce. It is largely consumed in Europe in the preparation of bleaching compounds, and when pure, is valuable to the manufacturers of glass.

The soft black ore, No. 1, is a hydrate of the peroxide of manganese, known under the name of wad. It contains of water two equivalents or 9 per cent.

Iron, 1.96 grains by analysis.

Its specific gravity is 1.47.

The specific gravity of the grey peroxide, No. 4, is 2.46.

(Signed) G. B. TREMENHEERE,

Capt. Executive Engineer,

Moulmain, 11th September, 1841.

Tenasserim Division.

Of a new species of Lagomys inhabiting Nepal, (with Plate,)—*Lagomys Nepalensis*, Nob. By B. H. Hodgson, Esq. Resident at the Court of Nepal.

Two fine specimens, male and female, lately received from Gosainthan, enable me to add the genus *Lagomys* to the Catalogue of Nepalese Mammals, and it may be remarked as characteristic of the enormous and sudden inequalities of elevation proper to this kingdom, that the tropical genus *Rhizomys*, and the arctic genus *Lagomys*, have been taken within 40 miles of each other.

The specimens of the latter genus just procured by me, were shot by my hunters on the margin of the sacred lake whence the Trisal Ganga River issues, and close to the verge of perpetual congelation. There were but a pair, of which both were obtained, as they moved about in the vicinity of the small natural cavity, or rocky fissure, that formed their abode. Their stomachs were full of fresh vegetable matter, like the contents of a hare's belly, nor was there near their abode any evidence of the hoarding propensities of the genus, or of a habit of digging for food. The height of the summer being the season at which the animals were taken, may explain the former circumstance however, but not the latter, and though it is said that these Rat-Hares dig for their food occasionally, I fancy this must be a mistake.

My species appears to be nearly allied to *Roylii*, and possibly may be identical, but I think not, and shall therefore give a summary description of it, which with the beautiful drawing of my painter, will serve at once to decide this specific distinctness or otherwise. Gosainthan, where the pair were killed, is not above 30 miles north of Catmandoo. No European has ever visited it; but as it is on the verge of the perpetual snow line, it cannot be much less than 16,000 feet above the sea.

The male of the pair is seven inches long from snout to vent, and the female half an inch less. The general appearance of the species is that of a Guinea-pig, but the natives of India, who know no such animal, liken it to a Rat, and as its Leporine teeth and soles (of the feet) are not obtrusive signs, the association of it to the Murine race seems natural enough. Its general likeness, for instance, to the *Rhizomys* or Bamboo Rat is very noticeable, particularly as the latter is apt to hide its tail. But a nice observer will at once mark the greater superior massiveness of the head in *Rhizomys*, together with the smaller eyes and ears, and will not be slow to refer these peculiarities to the highly fossorial habits of that genus.

Our present subject which, we shall name provisionally "*Nepalensis*," has a moderate hare-like head, but ears quite similar to those of the common Rat, with the exception of that small internal process near the conch,

which seems proper to the *Lagomides*. The ear is rather less than half the length of the head, is truncated, rounded, and nearly nude except on the anterior and incurved edge of the helix, where very short hairs are pretty closely set. The upper and outer pair of front teeth have a very deep longitudinal groove, so as to look like four instead of two, but neither these, nor the inferior pair are at all remarkable for size or strength, offering in this respect, a strong contrast to *Rhizomys*. The inner pair of upper teeth are palpable, but minute. The whiskers are long, and firm, reaching to the shoulders; the lips and the muzzle entirely furred: the eyes medial: the body full and cylindric: no vestige of tail: the limbs short, but fine, and of nearly equal length and strength before and behind: pentadactylous before, tetradactylous behind: the nails acute: the soles fully clad, except the termino-digital balls, and a tiny carpal pad placed a little behind the elevated thumb. The last named are the sole parts of the whole body, which are denuded of fur. The fur of the animal is Leporine in the general character, but softer and more silky. It is of one sort, about an inch long, and of uniform structure throughout each pile, or hardly perceptible, harsher in its apical portion. On the head and limbs the fur is shorter, more adpressed, and less silky. The general colour, internally, is blue black, but externally is deep bay from the snout to the mid-body, and black freckled with paler rufous, thence to the vent. Below the chin and belly are pale bay, and the limbs are the same. There is a pale spot, or tuft rather, at the outer base of each ear, and the mustachio is half dark and half light.

The following specific character may, for the present, indicate the animal:—

Lag. Nep. with broad, rounded, nudish ears, nearly half the length of the head, soles nude on the termino-digital balls only, and soft equable fur, which is dark bay from the snout to waist, and rufescently freckled, black thence to the vent: below and the limbs, paler bay; snout to vent 7 inches: head 2: ears $\frac{7}{8}$: palm (with nail) $\frac{3}{4}$: planta (with nail) $1\frac{1}{4}$: female similar, smaller, $6\frac{1}{2}$ from snout to vent. Habitat, Himalaya of Nepal.

Catmandoo, August, 1841.

Notice of a new form of the Glaucopinæ, or Rasorial Crows, inhabiting the Northern region of Nepal—Conostoma Emodius, (Nobis type.) By B. H. HODGSON, Esq. Resident at the Court of Nepal.

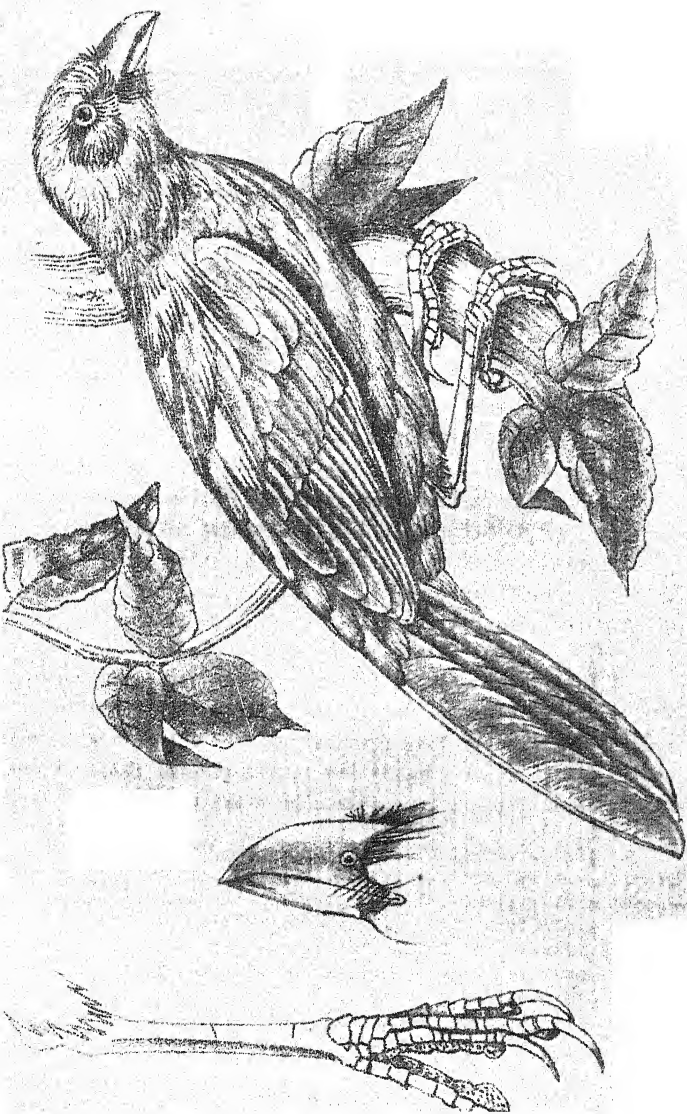
Amongst the very numerous forms* presented by the 850 species of Birds already known to me as inhabitants of Nepal, there is one which I believe to be still new to science, and to belong to a group, of the occurrence of which, either in these mountains or in the plains at their base, I know of no other instance, save that of the ubiquitous tree Magpies.

The group alluded to, is the Glaucopin, or Finch-billed Crows of Swainson; and the single species I am acquainted with, tenants exclusively the immediate neighbourhood of the perpetual snows.

In the lower and central regions, our bird appears to be represented by the Timaliæ and Crateropi, to both of which, and especially to the former, it bears in much of its structure, the same close resemblance that it does also in its manners; for all these birds alike have lax feeble plumage, short rounded wings, longish, broad, frail subgradated tails, and very large, yet not typically, terrestrial feet, though the habits are essentially terrene and rasorial. But, whereas the Timaliæ and Crateropi have a more or less Meruline bill, slender, and provided with membraned and open nares. The present birds, which we shall denominate generically Conostoma, (*κωνος* et *στομα*,) have the massive bill and simple concealed nares of the Magpies. The bill of the Crypsirinæ vel Dendrocittæ, or tree Magpies in particular, has much resemblance to that of the Conostomæ, owing to the clear arcuation of its whole commissure, and to the perfect entireness of its tip. There are differences, however, between the two even in the bills, in as much as that of Conostoma is more compressed, with sides less tumid yet broader ridges; while in Crypsirinæ, the other members, such as the long gradated tail, short tarsi, and considerably pointed wings, indicate habits less terrestrial than those of our bird. Conostoma is clearly a typical example of the Glaucopinæ of Swainson,

* One of the most remarkable of these is the Cochoa of Nepal, and which was characterised by me under that name in the Journal for June 1836. The expert naturalist would immediately perceive what my inexperience then noted not, viz. that this is a typical *ampeline* form, requiring to be placed between *Ampelis* and *Casmarynchus*, though Swainson asserts that the group is exclusively American.

To this genus we have since given the classic name of *Prosorinia*. In the same number of the Journal is the description of yet another rarity, first discovered and described therein, and which Swainson has since called *Nyctioris*. It is our *Bucia hodie*, *Napophilus*, a forest-haunting Bee-Eater. Mr. Swainson's name must merge in ours.



Conostoma Omodius $\frac{1}{2}$ Nat. Size

Foot and Bill full size

and its natural position would seem to be between *Glaucopis* and *Cypsirinæ*. In manners the present species is a shy forester, adhering to the wilds, and tenanting the skirts of forests, where brush-wood as well as trees abound. Five or six birds are usually found together, chattering, hopping, and scraping on the ground, and resorting to the trees and shrubs chiefly for shelter. Their food is principally insects of the soft and imperfect kind in summer: but in winter they doubtless take some vegetable food. Their essential form may be characterised thus:—

Bill short, strong, conico-compressed, with broad rounded ridges and vertical sides; the culmen and commissure entirely arched, the tips equal, obtuse, and entire. Nostrils circular, unfossed, furnished with a membranous raised edge all round, and concealed by incumbent setaceous plumuli. Rictus provided with a close series of short bristles. Wings short, feeble, almost entirely rounded, the 6th, 7th, and 8th quills usually equal and longest. Tail slightly elongated, rounded, consisting of 12 broad simple plumes. Feet very large and strong, yet not typically ambulatory. Tarsi elevate, nearly or quite smooth, exceeding much the central toe and nail. Toes medial, unequal; fores basally connected, and outer lateral considerably longer than the inner. Hind toe large, depressed, exceeding the outer fore, and with its large nail reaching to the middle of the central toe and nail. Nails simple, large, scarcely so acute or so curved as in *Crypsirinæ*.

Habitat, the northern region close to the perpetual snows.

Type. *Conostama Omodius*, Nob. new.

Specific character.

Conostoma with head, neck, and body above dull olive brown, clearest on the secondary alars—below, paler, and passing into sordid slaty blue, which forms, everywhere, the interior colour of the plumage. Iris brownish. Bill dull orange. Legs slaty grey. Sexes alike. Bill to tail $11\frac{1}{2}$ inches: bill $\frac{3}{8}$: tail $4\frac{3}{8}$: tarsus $1\frac{11}{16}$. Central toe and nail $1\frac{4}{16}$. Hind toe and nail $1\frac{2}{16}$. Weight $3\frac{1}{4}$ oz.

Catmandoo, August, 1841.

*A Monograph of the species of Wild Sheep.** By EDWARD BLYTH,
Curator to the Asiatic Society of Bengal.

The arrival of various spoils of different species of wild Sheep, since my memoir upon this genus of animals was read before the (Zoological) Society, enables me now to clear up several points which I formerly left as doubtful, as well as to include some additional species in the catalogue, and to indicate still others as probably distinct, and therefore desiderata to which the attention of travellers and others should be directed.

1. *Ovis Polii*, nobis, (the Pamir Sheep.) In the narrative of the celebrated Venetian traveller, Marco Polo, we read (in Marsden's edition, p. 142,) that upon the elevated plain of Pamir, eastward of Bokhara, and which is 16,000 feet above the sea level, "wild animals are met with in great numbers, particularly Sheep of a large size, having horns three, four, and even six palms in length. The shepherds form ladles and vessels of them for holding their victuals. They also construct fences for enclosing their cattle, and securing them against the Wolves, with which they say the country is infested, and which likewise destroy many of these wild Sheep or Goats" (*Moutoni v. Becchi* or 'Boucs.') More recently, an animal called the *Rasse* was indicated, from report, in Sir Alexander Burnes's Travels in Bokhara, (vol. ii. p. 208), and its horns have since been transmitted to the Royal Asiatic Society, by Lieut. Wood, of Sir A. Burnes's party, through the medium of G. T. Vigne, Esq.† In this magnificent specimen of

* This memoir upon the species of wild Sheep, read before the Zoological Society in July, 1840, has already been reprinted, with copious annotations bringing the subject up to my then state of knowledge, in Taylor's Magazine of Natural History, for May and June, 1841, and upon my arrival in India I found it again in type, and have availed myself of the opportunity to communicate some additional information.—E. B.

† Burnes "was told that the *Rasse* is larger than a Cow, but less than a Horse, of a white colour, with pendent hair under the chin," and a portion of skin attached to the occiput of the frontlet in London is covered with white hairs. "The flesh," he continues, "is much prized by the Kirghizes, who hunt and shoot the animal with arrows. It is said to delight in the coldest climates, and a common-sized specimen will require two horses to bear its flesh from the field. This creature is called *Rasse* by the Kirghizes, and *Kooshgar* by the inhabitants of the low countries." Lieut. Wood, however, (in the Narrative of his late Journey to the Source of the Oxus, p. 368,) distinguishes between the "*Rass* and *Kutchgar*, the former having straight spiral horns, and its dun colour being of a reddish tinge." It appears to me that three different animals

a frontlet, I incline to recognize (though not without hesitation) the *Ovis sculptorum*, formerly described by me from a horn in the Museum of the (London) Royal College of Surgeons, but as the characters of that specimen, as I originally drew them up, have not

are referred to under these names, two of which are confounded together by the latter author.

The *Koosh-i-Koh* of Sir Alexander Burnes' drawings now before me, refers to my *Ovis Vignei*, and the same, I am enabled to state positively, is the "*Kutchgar*" of Lieut. Wood, being also the "*Koch*" of the Sulimani range between India and Afghanistan. I shall quote Lieut. Wood's description of it under the head of *O. Vignei*; although this gentleman possessed the horns of both the *Ovis Polii* and *O. Vignei*, he does not appear to have distinguished them, but probably considered the latter to be the same species with the other, having horns incompletely developed. "A skeleton of this animal," he observes, "and several complete crania, were deposited, I believe, at Loodiana," and the crania here alluded to, five in number, together with some loose horns, are at present before me, and pertain to *Ovis Vignei*. Lieut. Wood confirms the statement of Marco Polo, mentioning, that "we saw numbers of horns strewed about in every direction, the spoils of the Kirghiz hunter. Some of these (being probably those of *O. Polii*) were of astonishingly large size. * * * The ends of these horns, projecting above the snow, often indicated the direction of the road, and wherever they were heaped up in large quantities, there our escort recognised the site of a Kirghiz summer encampment." This was at 14,400 feet above sea level. It is curious, (though by no means a recent discovery,) that the Kirghizes shoe their Horses with, and make stirrups from, the horns of these wild Sheep. "The shoes are nothing more than a semi-circular piece of horn placed on the fore part of the hoof. When the Horse is in constant work, it requires renewal at least once a week."

The noble frontlet of *Ovis Polii* in the Museum of the London Royal Asiatic Society was labelled "*Rass*, or *Roosh*," but it obviously cannot be the "*Rass*" stated by Lieut. Wood to have "straight spiral horns," and of which "the dun colour has a reddish tinge;" this refers, in the opinion of my friend Mr. Vigne, to the *Markbur* of Kabul, or *Rawacki* of Little Tibet, a race of very large feral Goats allied to the domestic animal, which is figured by Sir Alexander Burnes under the name of *Markhor*, (the locality not being specified,) and of which a skull and pair of loose horns have been transmitted to the Asiatic Society from Loodiana, together with the before-mentioned specimens collected by Sir Alexander Burnes. The *Markbur*, as I was informed by Mr. Vigne, inhabits also the hills of Budukshan; and I may observe, that its massive horns vary much in amount of spiral flexure, from the tense spirature of those of the Caffrarian Impoof, (*Boselaphus Oreas*,) or straight with a prominent ridge wound round them, to the corkscrew curvature of the horns of the Koodoo, (*Strepsiceros Koodoo*,) which is their most usual form, though sometimes they describe a still more open spiral than in that animal, more as in the Addax, (*Oryx Addax*,) or at least such specimens of the latter as have come under my inspection.

To recapitulate, I think it probable, firstly, that the *Rass* or *Roosh* of Pamir will prove to refer properly to the *Ovis Polii*, and may mention that the appellation *Rasse* is likewise bestowed in Java upon a small species of Civet, (the *Viverra Rasse*, Horsfield, or *V. Indica*, Is. Geoff, but not the *V. Indica* of British authors;) 2ndly, that the *Kooshgar*, *Kutchgar*, *Koosh-i-Koh*, or *Koch*, applies exclusively to *O. Vignei*, which is also the *Shá* of Little Tibet, but

hitherto been published; as its flexure, too, which suggested the appellation of *sculptorum*, would appear to form a less extended spiral than is perhaps normal, and the habitat of our present subject also proves to be different from that rather suspected with instance of the other, (namely, the *Taurus*,) I here propose to dedicate the present gigantic animal to the illustrious Venetian traveller of the thirteenth century by the name of *Ovis Polii*.

As compared with the Rocky Mountain Sheep of North America, the *Rass* or *Roosh* of Pamir differs in having the horns considerably less massive, but more prolonged, approaching more in character to those of the domestic *O. Aries*, but differing again from the latter, not only in their very superior size, but in having their two front angles about equally developed. As in the Rocky Mountain species, and I believe also the *O. Aries* normally, the pair at first diverge backward, descending to gyre round at a parallel with the axis of the body, and inclining, as they again spire backwards, more outward to the tip. The horns described were in their seventh year of growth, and measure 4 feet 8 inches in length, following the curvature, and $14\frac{1}{4}$ inches round at base, having the tips, which are continued round till they point obliquely backwards, 45 inches apart. The width of their upper plane is $3\frac{1}{2}$ inches at base, $2\frac{3}{4}$ inches at the distance of one foot from the base, and $2\frac{1}{2}$ inches at two feet distance from the base; the depth of the base inside is 5 inches, and distance apart of the pair, measured outside, where they gyre forward at a parallel, 21 inches. The years of growth are successively $15\frac{1}{2}$, $10\frac{1}{2}$, 13, 8, 5, 3, and the last (incomplete) 1, inches. The College of Surgeons' specimen, a single horn, was in its eighth year of growth, but measures only 4 feet 4 inches round the curvature; its depth towards the base is 6 inches, and greatest width, about the middle, $2\frac{3}{4}$ inches. The successive annual growths are $12\frac{1}{2}$, 9, 8, 8, 7, 5, $3\frac{1}{2}$, and the incipient eighth, 1 inch. It is curved in a spiral involution, and scarcely outwards for three-fifths of a circle, when it gradually inclines more so to the tip, the horn describing one circle and about a

not the *Snd* of Great Tibet, the latter being the *O. Nahoor*; and 3rdly, that Lieut. Wood's "*Rass*" refers to the *Markbur*, while the true *Rasse*, (*Ovis Polii*,) the horns of which were transmitted by him to London, does not appear to have been distinguished by him from the species which he rightly describes under the denomination *Kutchgar*.—E. B.

a third. When upon the head, it must accordingly have gyred considerably inward, instead of descending at a parallel with the other, as indeed is almost invariably the case with the domestic *O. Aries*. Both specimens are of a pale colour, and indented with rugged transverse striæ, in general half an inch apart. Considering, indeed, the differences of the two specimens, it is by no means improbable that they will prove to be of allied rather than of the same species, in which case my former name of *O. Sculptorum* might be retained for that to which it was applied.

2, 3, and 4.—The Museums of Western Europe do not, that I can learn, contain any portion of the Siberian Argali, *Ovis Ammon* of Pallas, that might serve for comparison with the Rocky Mountain Sheep of North America, *O. montana* of Desmarest; but as the Kamtschatka Argali is described as a distinct species, *O. nivicola*, by M. Eschscholtz, in his *Zoologischer Atlas*, (differing from the two preceding in its inferior size, and in wanting, it would appear, the pale disk surrounding the tail, so conspicuous in both the others,) the probability is thus enhanced, that the Siberian and Rocky Mountain species are not the same, however closely they may resemble. The descriptions of *O. Ammon* would seem to apply in every particular to the *O. montana*, though it is still probable that actual comparison of specimens would lead to the detection of some discrepancies, as generally, but not always, happens in like cases. I may notice, that while Mr. Drummond affirms that the horns of old rams of *O. montana* "attain a size so enormous, and curve so much forwards and downwards, that they effectually prevent the animal from feeding on level ground," the same had previously been remarked by Strahlenberg of the *Argalis* of Siberia, and no doubt is equally observable in the *Rasse* of Pamir. The finest specimen of a head of the Rocky Mountain animal, of seven heads of adult males examined, is in the collection of this (the Zoological) Society, and gives the following admeasurements; horns 3 feet 5 inches over the front ridge, and $17\frac{1}{4}$ inches round at base, where the front angles are $4\frac{3}{4}$ inches apart. They number nine years of growth, which successively give 9, $7\frac{1}{2}$, $6\frac{1}{2}$, 5, $4\frac{1}{2}$, 4, $2\frac{1}{2}$, $1\frac{1}{4}$, and 1 inches. They are nearly equilaterally triangular, but bulge a little between the angles, having the inner or front angle obtusely prominent, the posterior

double, or forming a second plane at a slight angle with the superior one, and the inferior angle (if such it can be called) much rounded off: the greatest depth of the horn is about 6 inches; from base of front angle to tip they measure 11 inches; and the tips apart 26 inches. They are everywhere strongly furrowed across, more particularly in front, the intervals between the grooves swelling out considerably; and they gradually become, as in all the rest of the genus, more compressed to the extremity.

Of the *O. nivicola* of M. Eschscholtz, that naturalist writes: "The specimen described is a male in winter garb, measuring 5 feet (French?) in total length, and 2 feet 5 inches high. Its outer coat is of a yellowish-grey colour, brighter on the under parts, and inclining to straw-yellow on the head and neck; the markings in front of the limbs are of a rust colour; horns equilaterally triangular, 3 inches thick at base, and gyring outwards to form one complete spiral circle, 10 inches in diameter, and having their points directed outwards and forwards; the upper and posterior portions of the horn are level, and marked with deep annual indentations, which successively measure 7, 6, 5, 4, 3, 2, 2, and $1\frac{1}{2}$ inches, making eight years of total growth, besides which, there are numerous minor indentations or ordinary cross striæ, but no protuberant intervals." From the figure they would seem not to bulge between the angles, as is usual, though not invariably the case, with the Rocky Mountain species; as also to be somewhat more tensely spiral, as if pulled a little outward. The appearance both described and figured at the base of the fore-limbs externally, I suspect to be nothing more than the *axilla*, that had been twisted outwards in the mounting of the specimen. M. Eschscholtz describes this animal to be very numerous on the mountains of Kamtschatka, residing upon the snow-clad heights in summer, and descending to the lower regions in winter. A notice of its Chamois-like agility occurs in the Narrative of Kotzebue's Voyage from 1823 to 1826.

In the 18th volume of the Asiatic Researches, (part ii,) Mr. Hodgson, of Nepál, gives a figure of a horned female of the Nahoor Sheep, and also of the skull and horns of a young Ram, which he erroneously refers to that species as since described by him. He also mentions having once possessed a pair of the horns, which he "could only lift

from the ground with a considerable effort ;" but it is necessary to observe, that the description which he gives in the volume adverted to, of the mutilated skin of a young wild Ram, procured in mid-winter, refers evidently to the Nahoor, and not to the species with horns having a triangular section, which is the subject of the present notice. According to Mr. Hodgson, the horns of this young specimen are "equilaterally triangular," as the figure likewise represents ; whereas the Rocky Mountain species would at the same age have much compressed horns, far from attaining to an equilateral triangle. Should a true species be here indicated, as is not improbable, distinct from *O. Ammon*, I propose that it be dedicated to that assiduous investigator of Nepalese Zoology, and be accordingly termed *O. Hodgsonii*.*

* This animal has since been more elaborately described and figured by Mr. Hodgson, under the appellation *Ovis Ammonoides*, (*vide* "Journal," ante, p. 230,) but except that no notice is taken of the pale disk surrounding the tail, as in the true Stags, which is a very conspicuous feature in the Argalis of Siberia and North America, and that the ears and tail would appear to be rather longer at least than my notes specify of the Rocky Mountain animal, (for, unfortunately, I have not Pallas's *Spicilegia* now to refer to, for the very complete description of *O. Ammon* furnished by that able naturalist,) I cannot perceive in what Mr. Hodgson's alleged species differs from the latter, and very much incline to the opinion that it will prove to be no other. The *O. Ammon* is described to be common in the Mongolian, Songarian, and Tartarian solitudes, inhabiting chiefly the lower ranges of the mountains, and it may be that Mr. Hodgson's specimens are trans-Himalayan, and were perhaps brought from a very considerable distance to the North-eastward. I mean to supply, however, some representations of (at least) the Rocky Mountain animal, which, together with the following description, will probably enable Mr. Hodgson to arrive at a more decided opinion on the subject.

The Argali of either continent approaches the European Stag in the size of its body, but is lower on the legs ; having a pale disk, as large as in the Wapiti, surrounding its very short tail ; and truly enormous horns (as described in the text,) attaining to a circumference of sometimes more than $1\frac{1}{2}$ foot at base, with a length of 4 feet over the spire. (The American pair to be figured is the same as that described in the text.) Its colour is pale greyish fawn, or light chocolate-brown in younger individuals which have their coat newly renovated ; with the generic dark markings on the face, chest, and front of the limbs, more or less developed : there is a ridge of lengthened hair on the back of its neck ; and the chaffron of the male becomes excessively bombed with age, contrary to what has been asserted.

A recent American specimen, with horns $3\frac{1}{2}$ feet long, measured 6 feet from nose to tail, and was 3 feet 8 inches high at the back ; from nose to base of horns $9\frac{1}{2}$ inches, ears $4\frac{1}{2}$ inches, and tail 4 inches. A large Asiatic Argali, with horns 4 feet (Russian) in length, and one of which weighed 16 Russian or 15 English pounds, was $6\frac{1}{2}$ feet (English measure,) from nose to base of tail, and weighed 310 medical pounds ; the female is a third smaller, and a fine Asiatic individual weighed 209 $\frac{1}{2}$ medical pounds. The horns of a large American male have already been described, and

5. *O. Californiana*, Douglas.—The Jesuit Missionary, Venegos, observed in California “a kind of wild Sheep, the size of a calf of one or two years old, with extraordinarily thick horns, resembling those of a common Ram, and *tail shorter than that of a Stag*,”

those of the female, (as plainly appears from Pallas’s figure of this sex,) though proportionately diminutive, become somewhat bulky towards the base in full grown specimens, assuming thus a corresponding character to those of the male.

The coat of the (American) Argali, observes Dr. Richardson, “like that of the Rein Deer, is, on its first growth in the autumn, short, fine, and flexible,” *i. e.* when the future tips of the hairs are alone put forth; “but, as the winter advances, it becomes coarser, dry, and brittle, though at the same time it feels soft to the touch. At the latter season the hair is so close at its roots that it is necessarily erect. Its colour is pale umbre or wood-brown, except on the buttocks and posterior part of the belly, which are whitish; a deeper and more shining brown prevails on the anterior aspect of the legs,” the chest, fore-neck, and face; “the short tail is dark brown, and a narrow brown line, extending from its base, runs up through the white disk to unite with the colour of the back. As the ends of the hairs (in which the colour resides) are gradually rubbed off during the progress of the winter, the tints become paler, and the old rams are thus almost white in the spring.” At this latter season, analogy indicates that the Argali again changes its coat, to assume a distinct summer garb, which (if I remember rightly) is described by Professor Pallas. According to this naturalist, an Asiatic lamb, of about three months old, and weighing 84 medical pounds, measured 3 feet from nose to tail, and 2½ feet high: it much resembled a young kid, except in shewing a large flat protuberance at the place of each horn, and was covered with frizzled woolly hair of a dark grey colour, and which, on some parts, was 4 or 5 inches long.

Like all the domestic breeds of Sheep, when left at liberty to follow their own inclinations, it has been observed that the Asiatic Argali purges itself in the spring with *Ranunculaceæ* and other acrid plants, until vegetation of a milder kind begins to spring up, and shrubs to sprout, which, with alpine plants, constitute its ordinary food. It frequents the salt-marshes which abound in Siberia, and licks up the salt efflorescence diffused over the ground; and the American animal is described by Dr. Richardson to pay daily visits to certain caves in the mountains, situate in slaty rocks, that are encrusted with a saline efflorescence of which they are fond.

Upon the Rocky Mountains of North America, the Argali, according to Dr. Richardson, “frequents elevated and craggy ridges, and collects in flocks consisting of from three to thirty, the young rams and the females herding together during the winter and spring, while the old rams form separate flocks, except during the month of September, which is their rutting season. The ewes bring forth in June or July, and then retire to the most inaccessible heights. Their favorite feeding-places are grassy knolls, skirted by craggy rocks, to which they can retreat when pursued by Dogs or Wolves. Mr. Drummond informed me, that in the retired parts of the mountains, where the hunters had seldom penetrated, he found no difficulty in approaching the flocks of this species, which there exhibited that simplicity of character so remarkable in the domestic breeds; but where they had been fired at, they were exceedingly wild, alarmed their companions at the approach of danger by a hissing noise, and scaled the rocks with a speed and agility that baffled pursuit.”

whence it would appear that the Rocky Mountain species, or a near ally, is here alluded to. Mr. Douglas describes the Californian Argali to have a tail 18 inches long (vide *Zoological Journal*, vol. iv. p. 332.) Its length, he observes, from nose to base of tail,

In Asia, the Argali is described by Pallas to affect the bare rocks, upon which it is constantly found basking in the sunshine; preferring a temperate climate, though its range extends northward to a very severe one. No animal is more shy, and it gradually abandons a country in proportion as it becomes peopled. It is almost impossible to overtake it upon the ground which it chiefly frequents, as it retreats upon the least alarm in the direction of the most inaccessible crags, scrambling up and over the rocks with surprising agility, but ever and anon stopping to gaze at its pursuers, and successively veering from side to side as it runs, in the same manner as the domestic animal. The adults are quite untameable, but the lamb becomes perfectly domesticated if taken young. In autumn, when these animals descend from the mountains, they are fat and in high condition, but in spring they are very lean, for want of choice food, when they return to the sunny glens of the high mountains. Their lambs, one or two in number, are born before the melting of the snow; and the males butt at each other for the possession of the females in precisely the same manner as the domestic ram.

The flesh of the Argali is pronounced by all who have tasted it, when in season, to be equal, if not superior, in flavour to the finest English mutton; and the same is remarked of other wild species of this genus; though, when out of season, they would appear to be tough and of rank flavour, on which principle may be reconciled a variety of conflicting testimonies.

The Argali formerly inhabited the country about the river Irktisch, as well as other parts of Siberia, where it is now no longer met with, since colonies have been planted in those dreary regions: at present it is chiefly known to abound in the territory to the eastward of Lake Baikal, extending northward on the banks of the Lena to lat. 60°. Its identification to the southward, upon the eastern Himalayas, and consequent presumed diffusion over the intervening mountain ranges, between the great sandy deserts on the west and the frontiers of China, is therefore not improbable. In America, its most closely allied representative, if it be not the very same species, is confined to the western side of the Rocky Mountains, as in Asia it inhabits the opposite eastern region; being found, according to Dr. Richardson, upon the lofty chain of the Rocky Mountains, inhabiting from its northern termination in lat. 68° to about lat. 40°, and most likely still further south. They also frequent the elevated and craggy ridges with which the country between the great mountain ridge and the Pacific is intersected; but they do not appear to have advanced further to the eastward than the Rocky Mountains, nor are they found in any of the hilly tracts nearer to Hudson's Bay. (*Fauna Americana-borealis*.) More recently, the same naturalist writes (in the *Zoological Appendix to Capt. Beechey's Voyage*)—"This species inhabits the timbered parts of the Rocky Mountains, and the hilly countries between that range and the Pacific, from North California to the 62d parallel." He there expresses his opinion that the Kamtschatka species, as described by Eschscholtz, "appears distinct;" and it may be that the two are found together in the territories of the Tungusi, as the Californian species would appear to coexist with the ordinary American Argali in the regions adjacent to the Columbia river: these latter are doubtless frequently confounded together.—E. B.

is five feet 10 inches; height of the shoulders 2 feet 8 inches; girth behind the shoulders 6 feet; head 16 inches long, 7 [to] between the eyes, and 9 [to] between the horns; ears erect, $1\frac{1}{2}$ inch [$4\frac{1}{2}$ inches?] long, obtuse. The horns deposited in the Museum of this (the Zoological) Society, bear a general resemblance to those of the Rocky Mountain species, but are smoother, and form a much more open spiral: the terminal third is very much compressed, the medial intermediate, and the basal very thick and triangular: they were only in their fifth year of growth, and would doubtless have attained to much greater dimensions. Their length is 32 inches, measured over the front-ridge, and girth at base $14\frac{1}{2}$ inches, having a span of $12\frac{1}{2}$ inches from base to tip inside: from the tip to first annual depression they measure $12\frac{1}{2}$ inches, and then successively $6\frac{1}{4}$, $5\frac{1}{2}$, $4\frac{3}{4}$, and the incipient fifth year's growth 2 inches. They do not bulge between the angles, which are rather obtuse, and, as usual, are transversely striated. Approximate distance of the tips apart 33 inches.

"From the testimony of the Indian tribes about the Great Falls of the Columbia River," writes Mr. Douglas, "this species appears to inhabit the subalpine regions of Mount's Wood, St. Helen's, and Vancouver, but is more numerous in the mountainous districts of the interior of California. The only good skin that ever came under my observation was in lat. $46^{\circ} 14' 55''$, and long. $121^{\circ} 17' 0''$. Forbes, in his recent work on California, appears to allude to it by the name of *Berindo*, which in Mexico is applied to the *Antilocapra furcifera*.* He quotes, however, the description by Venegos, including the statement that it has a short tail, and remarks, that "they still abound in the plains at the foot of the mountains, and are always found in large herds." It does not, from the context, appear to me that the prong-horned animal is intended.

* In reference to the name which is here employed, Colonel Hamilton Smith has stated, in one of his letters to me, "that when I first shewed my drawings and description of this animal in Paris, it was totally unknown, and my account was disbelieved; Geoffroy St. Hilaire telling me 'vous permettez qu'on doute.' That description, with the drawing, was then already before the Linnæan Society, and after twenty months, when Mr. Ord's account had come out, they at length published mine," &c. This animal is the *Dicranoceros* of Colonel Smith, *Antilocapra* of Ord, and *Mazama* of Ogilby.—E. B.

From these we might proceed, through the domestic *Aries*, to the species generally typified by the *Mouflon* of Corsica; but I shall interpolate a small group from the Himalaya, and apparently Caucasus, distinguished by having smooth and sub-cylindrical horns, that form a bold arc outwards at nearly right angles with the axis of the body, and have the tip turned backward. Such is

6. *O. Nahoor*, Hodgson.—The Nahoor or *Nervati*, and *Sna* (not *Shà*) of Tibet. Size of the larger breeds of tame Sheep, with pale horns; and general colour dull brownish grey in old animals, with the ordinary dark markings on the face, breast, and limbs, more or less developed. Younger specimens, more particularly, have their coat, when renovated, tipped with a light fulvous tint, deeper along the middle of the back; the tail is bushy, and conspicuously white, its medial portion generally dark. Length, as given by Mr. Hodgson, 4 feet from nose to base of tail, and height of the back 32 inches. A female was 3 feet 4 inches from nose to tail, and stood 29 inches high at the shoulder. From nose to between the horns a male measured $8\frac{1}{2}$ inches; the ears $4\frac{1}{2}$ inches; and tail 4 inches, or 7 inches to the end of the hair. A pair of horns in the Museum of this Society, which are far from having attained their full growth, measure 12 inches in circumference at base, and $20\frac{1}{2}$ inches long over the curvature, having their tips 27 inches asunder: their successive annual growths were respectively $6\frac{1}{2}$, 4, 3, $2\frac{3}{4}$, $2\frac{1}{2}$, and $1\frac{3}{4}$ inches.* Those of a very old female in the British Museum, have precisely the same curvature as in the male, only that the tips do not turn so much backwards; they are, however, much compressed, and measure $9\frac{3}{4}$ inches long, $4\frac{1}{2}$ inches round, with the tips 14 inches apart. Another female, in the collection of this (the Zoological) Society, is entirely destitute of horns. The latter, and a young male which I formerly examined at Mr. Leadbeater's, accorded perfectly with the description by Mr. Hodgson, having pale slaty blue hairs, deeper on the back, and tipped with a rufous tint, more particularly on the back, which caused

* A handsome frontlet now before me, whereof the horns are in their tenth year of growth, gives the following admeasurements. Horns $24\frac{1}{2}$ inches long over the curvature, and $11\frac{1}{2}$ inches round at base, with the reverted tips 26 inches asunder. In another, but 7 years old, the horns measure $12\frac{1}{2}$ inches round at base, with a length of $2\frac{3}{4}$ inches. The annual growths of the former are successively $8\frac{1}{2}$, $2\frac{3}{4}$, $2\frac{1}{2}$, 2, $1\frac{3}{4}$, $1\frac{1}{2}$, $1\frac{1}{4}$, $1\frac{1}{4}$ and 1 inches.—E. B.

the animal to appear of a pale fulvous or isabelline hue. An old male in the Museum of the Linnæan Society,* and the aged female in the British Museum, together with another skin which I have seen, have not only no trace of this colour in their present state of *pelage*, but I doubt whether they shewed much of it when their coat was new: the colour of all three is a dingy grey-brown, not easy to express in words.

The horns of the Nahoor differ but little in flexure from those of the next species, but may nevertheless be distinguished by many differences, in general strongly pronounced; as their superior size; the greater proportional thickness of the basal half, beyond which they narrow somewhat abruptly; the flatness of their dorsal aspect, with a much more acutely raised ridge along its middle; and by the comparative sharpness of all the angles, together with the existence, generally, of some traces of cross-striæ, more particularly towards their compressed tips; whereas the horns of the Burrhel Sheep are much less angular, of a deep rufous-brown colour, and quite smooth. Those of the female Nahoor described were entirely destitute of cross-furrows; but all have the marks of annual growth conspicuously indented.

This species, according to Mr. Hodgson, "inhabits the Kachâr region of Nepal, northward of the habitat of the Jharal Goat, amid the glaciers of the Himalaya, and both on the Indian and Tibetan sides of that range." Mr. Vigne informs me, that it is plentiful in Great but not in Little Tibet. I suspect that it is never found at so considerable an altitude as the next species.

7. *O. Burrhel*, nobis.—Smaller and more robust than the Nahoor, with shorter ears, and very dark horns; having no white upon it; and general colour dark and rich chestnut-brown, or mahogany, with the ordinary black markings upon the face, chest, and front of the limbs, very distinct; tail apparently minute.

This handsome species bears pretty much the same relationship in appearance to the Nahoor, which the English breed of South Down domestic Sheep bears to the Leicester breed, except that there is

* Mistaken for *Ovis Ammon* in the Fauna Americana Borealis, vol. i. p. 274, nap for a second specimen of *O. Burrhel* in part 6, p. 79, for July 10, 1838, of the Proceedings of the Zoological Society.—E. B.

not so much difference in size. Length, of the unique stuffed specimen in the Museum of this (the Zoological) Society, from nose to tail, 54 inches, but a foot less would probably give the dimensions of the recent animal, as the skin is evidently much stretched; height of the back 32 inches, from which also about 2 inches might be deducted; from muzzle to base of horn 8 inches, and ears $3\frac{1}{2}$ inches. The horns measure 20 inches over the uppermost ridge, and 10 round at base, having their tips 25 inches apart; but those of a specimen noticed in the Bengal Sporting Magazine, (for 1839, p. 295,) were $25\frac{1}{2}$ inches long, with a girth of $11\frac{1}{2}$ inches; and a horn of this same species, which I examined at Mr. Leadbeater's, had attained a length of 2 feet, and circumference of 11 inches at base, having a span of 14 inches from base to tip inside, and numbering at least ten indications of annual growth, and probably at least one more towards the tip, which could not be made out with certainty. The respective lengths of these were successively $10\frac{1}{2}$, $2\frac{1}{2}$, $2\frac{1}{4}$, $1\frac{3}{4}$, $1\frac{3}{4}$, $1\frac{1}{2}$, 1, 1, $\frac{3}{4}$, and the basal $\frac{1}{2}$ inches. The coat of the Burrhel Sheep is rather long, and harsher than that of the Nahoor, having less wool concealed beneath it than in the Moufflon and Rocky Mountain species. The female is undescribed, and I have met with no other specimens than are here mentioned.

In the description of the preceding species, the principal differences are stated which distinguish the horns of that animal from those of the present one. The Burrhel's horns have all the ridges rounded off, though still sufficiently distinct, and the marks of annual growth are deeply indented, the horn bulging a little between them. Upon a front view the backward curvature of the tips disappears altogether, and the animal has an imposing appearance, finer than that of the Nahoor. Its colour is much darker than the summer dress of the Moufflon Sheep.

The Burrhel would seem to inhabit a much loftier region of the Himalaya than the Nahoor, where it bounds lightly over the encrusted snow, at an altitude where its human pursuers find it difficult to breathe. It has the bleat of the domestic species, as indeed they all have, and is very shy and difficult of approach. Flocks of from ten to twenty have been observed, conducted by an old male, which make for the snowy peaks upon alarm, while their leader scrambles up some crag to reconnoitre, and if shot at and missed, bounds off a few paces fur-

ther, and again stops to gaze. They pasture in the deep hollows and grassy glens. The Society's specimen was met with near the Boorendo Pass, at an altitude estimated to have been from 15,000 to 17,000 feet. The notice in the 'Bengal Sporting Magazine' refers to the same locality; and another notice most probably alludes to this species, in Lieut. Hutton's 'Journal of a Trip through Kunawar,' published in the 'Journal of the Bengal Asiatic Society' for 1839, p. 994.* Finally, Mr. Leadbeater informed me, that the horn described as having been in his possession was brought from Nepál, together with specimens of the Nahoor and Musk, and the skull and horns of a Himalayan Ibex, which I also examined.

8. *O. Cylicornis*, nobis, (the Caucasian Argali).—Colonel Hamilton Smith notices this animal in his description of *O. Ammon*, (published in Griffith's English edition of the "*Regne Animal*," vol. iv. p. 317,) and writes me word, that an individual died on landing it at Toulon, whither it had been brought by a French Consul, who did not preserve the skull or skin, but set up the horns, which were quite fresh when he saw them. "Each horn was about 3 feet long, arcuated, round, as thick at the top as at the base, of a brown colour, nearly smooth, and about 15 inches in circumference. They were so heavy and unmanageable," writes Colonel Smith, "that I could not lift both together from the ground, nor place them in that kind of juxta-position, which would have given me an idea of their appearance on the head. I could not well determine which was the right, or which the left horn. Circumstances prevented my taking a second view of them, as they arrived only the day before I left Paris, and they are now doubtless in the Musuem of that capital." In my former paper I alluded to this animal as probably distinct, and apparently allied to the Burrhel: the foregoing details confirm me in that opinion, and remove all doubt of its distinctness, as there is no other species to which they will at all apply. The sketch

* More recently, I perceive that Lieut. Hutton has identified the animal here referred to with *O. Nahoor* (vide 'Journal,' 1840, p. 568), but it is probable that both species are found there, and they cannot well be confounded after the description which I have given of *O. Burrhel*. Of the *Ovis Ammon*, Lieut. Hutton observes, "I could learn nothing, save that an animal apparently answering to the description is found in Chinese Tartary, and I saw an enormous pair of the horns nailed, among other kinds, to a tree as an offering to Devi." These, however, may have belonged to *O. Poliü*.—E. B.

which Colonel Smith has favoured me with, represents a Sheep horn, apparently of the same general form as those of the Burrhel and Nahcor; but the dimensions specified are very superior to those attained in the instance of either of the two Himalayan species adverted to, and I can only suppose that the (reverted?) tips had been broken off, and the truncated extremity worn smooth. The wild Sheep of Caucasus and Taurus are at present little known, nor does any notice of this genus occur in the catalogue of Caucasian animals, published by M. Ménétries; though it is nevertheless certain, from the vague incidental notices of various travellers, that some, and not unlikely several, exist. At Azaz, by the foot of Taurus, Mr. Ainsworth mentions having seen an animal, which he designates *Ovis Ammon*, (vide Travels in Assyria, Babylonia, and Chaldea, p. 42.)*

9. *O. Gmelini*, nobis, (the Armenian Sheep).—This species belongs to the Moufflon group, but is yet very different from the Moufflon Sheep of Corsica. It is described and rudely figured in the *Reise durch Russland* (vol. iii. p. 486, and Tab. LV.) of the younger Gmelin; and the skull and horns, forwarded by that naturalist to St. Petersburg, have been figured and described by Pallas in his *Spicilegia* (Fasc. xii. p. 15, and Tab. V. fig. 1.) Messrs. Brandt and Ratzeburg erroneously identified it, at the suggestion of M. Lichtenstein, with the wild Cyprian species, the horns of which have a nearly similar flexure. Fine specimens of the male, female, and young, lately received by this Society from Erzeroom, enable me to give the following description:—

Size of an ordinary tame Sheep, with a remarkably short coat,† of a lively chestnut-fulvous colour, deepest upon the back; the limbs and under-parts whitish, with few traces of dark markings, except a finely contrasting black line of more lengthened hair down the front of the neck of the male only, widening to a large patch on the breast; and in both sexes a strip of somewhat lengthened mixed black and white hairs above the mid-joint of the fore-limbs anteriorly, which cor-

* Very probably, however, this notice refers to the next species, *O. Gmelini*; as may, also, that of Captain Mignan, who mentions seeing "flocks of mountain Sheep, the Chamois, and wild Goats," at the foot of the Aligez range. Vide 'Winter Journey to Koordistan,' vol. i. p. 195.—E. B.

† Evidently the summer garb of the species.—E. B.

responds to the tuft of *O. Tragelaphus* ; tail small, and very slender : horns of the male subtrigonal, compressed, and very deep, with strongly marked angles and cross striæ, diverging backwards, with but a slight arcuation to near the tips, which incline inwards. As regards the flexure alone, but not the character of the horn, which is allied to that of the common Ram, this handsome species links the Moufflon group with the Nahoor and Burrhel group.

Length nearly 5 feet from nose to tail ; the tail 4 inches : from nose to base of horn 8 inches ; and ears $3\frac{1}{2}$ inches. Horns (about full grown, or nearly so,) 20 inches over the curvature, 10 round at base, 4 deep at base inside, their widest portion 2 feet apart, and tips 21 inches, with a span of $13\frac{1}{2}$ inches from base to tip inside ; their colour pale. Around the eye and muzzle this species is whitish ; the chaffron and front of the limbs are more or less tinged with dusky, and its coat is rather harsh, and fades considerably in brightness before it is shed. Female generally similar, but smaller, with no black down the front of the neck, and in the observed instances hornless. The lengthened black hair of the male is only 1 inch long, and that composing the tuft on the fore-limbs is so disposed that the latter is white in the centre, flanked with blackish.

According to M. Gmelin, this species is found only on the highest mountains of Persia. Its rutting season takes place in September, and lasts a month ; and the female yeans in March, producing two or three lambs at a time : the males, he informs us, are very quarrelsome amongst each other ; insomuch that he had been at one place where the ground was completely strewn with horns that had been knocked off in their contests ; so that if any variation in the flexure of these horns had been observable, this industrious naturalist would doubtless have remarked it. Sir John McNeill informed me, that "it appears to be the common species of the mountains of Armenia ; occurring likewise on the north-west of Persia : " but the wild Sheep of the central parts of Persia is evidently distinct,* "having horns much more resembling those of the domestic Ram, being spiral, and completing more than one spiral circle.—I think I am not mistaken in supposing," continues Sir John, "that I

* As also that of the eastern districts, which appears to be *O. Vignei*.—E. B.

have also had females of this species brought to me by the hunters, with small horns, resembling those of the ewes of some of our domestic Sheep; but, on reflection, I find that I cannot assert this positively, though I retain the general impression." It is highly probable, that a wild type of *O. Aries* is here adverted to, which would thus inhabit the same ranges of mountains as the wild common Goat, (*C. Aegagrus*): and with respect to the circumstance of horns in the female sex, I may here remark, that this character is very apt to be inconstant throughout the present group. It has already been noticed in the instance of *O. Nahoor*; and the elder Gmelin states that the females of *O. Ammon* are sometimes hornless, while those of the Corsican *O. Musimon* are generally so. The same likewise happens in different species of wild Goats, in the Goral of India, and in the prong-horned animal of North America; and even in the Gazelles, and other bovine-nosed species of what are commonly confused together under the name of Antelope, there have been instances of hornless males as well as females. A male Spring-bok of this description, as I am informed by Colonel Hamilton Smith, was long in the possession of the Empress Josephine; and the specimen of *Ixalus Probaton*, Ogilby, in the Museum of this Society doubtless affords another example of the same phenomenon.

10. *O. Vignei*, nobis: the *Shá* (not *Sná*) of Little Tibet, and *Koch* of the Sulimani range between India and Afghanistan.*—This fine species is closely allied to the Corsican Moufflon, but is much larger, with proportionally longer limbs, and a conspicuous fringe of lengthened blackish hair down the front of the neck, and not lying close, as in the Moufflon.† Its size, as I am informed by Mr. Vigne, is that of a large Fallow Deer, and "from the general appearance of these animals, their length of leg, and swiftness on the mountains, they reminded me," remarks that gentleman, "of Deer, rather than Sheep."

* Also the *Kutchgar* of Pamir, described by Lient. Wood, and *Kooshgar* or *Kooch-i-Koh* of Sir Alexander Burnes; *Ovis cycloceros*, Hutton, ('Calcutta Journal of Natural History, No. IV. p. 557.')

—E. B.

† At least as in the Mufflon in summer dress, for in winter it also hangs loosely in this animal. I believe now, however, that the summer and winter coats of both species will be found to correspond in this particular.—E. B.

The general colour of this animal, to judge from an elaborately finished painting, taken from a living individual in its native country by Mr. Vigne, to whom we are indebted for all we know concerning the species, is a rufous brown, apparently not so deep as in the Moufflon; the face livid, or devoid of the rufous tinge of the body, and not terminated by a white muzzle, as in the Moufflon Sheep: the belly is white, separated by a black lateral band; and the limbs are brown, not mottled, as in the Moufflon, but with a whitish ring immediately above each hoof, then a dark ring, and above this a little white posteriorly, as in the Neelgai. The fringe in front of the neck is doubtless peculiar to the male, and the hairs of it would appear to be 4 or 5 inches long, and hang loosely. Tail about 6 inches long, and slender, apparently resembling that of the Armenian species rather than the Moufflon's.*

* This species has been described as the "Wild Sheep of the Paropamisian range," by Captain Hay, (in the 'Journal,' for 1840, p. 440,) and I have no doubt of the correctness of this identification, though certain discrepancies are deserving of being noticed. Capt. Hay states the muzzle to be white (as in the Corsican Moufflon); the legs, too, to be "covered with white, smooth, short hair; belly white; tail small, short, and together with the buttocks white. The general colour" he says, "is pale rufous inclining to grey, and fading off to white beneath. A large beard from the cheeks and under-jaw, divided into two lobes, which are white, and connected to a streak of long black flowing hair reaching to the chest. The adult male stands 3 feet 4 inches at shoulder: from nose to tail 5 feet 4 inches; head 1 foot; neck ponderous, 14 inches long, and 24 in circumference; girth of body, behind shoulders, 4 feet. The female is inferior in size, and not so much of a rufous colour; having small horns about 6 inches in length, which incline backwards and outwards. Those of the male are 2½ feet in length, and 12 inches round at base," &c. "The lambs are the colour of the female, have a dark stripe down the back, and in front of the fore-legs. They are produced in May and June."

Drawings of both sexes of this same species, transmitted by the late unfortunate Sir Alexander Burnes, are also before me, and present a somewhat different coloration from either of the above. The male is stated to have measured "4½ feet [5½ feet?] in extreme length, from nose to tail-tip, and 3 feet 5 inches high, from the sole of the foot to the shoulders; female 3 feet 10 inches long, and 2 feet high." Both are evidently represented in summer dress, of an uniform light bay colour (including the limbs and tail), rather more vivid in the male, and merely fainter on the under-parts; there is no trace of lateral band; the face of the male only is coloured more livid, and with no white muzzle in either sex; nor is there any mottling near the hoofs (as in Mr. Vigne's drawing), but a slightly dark shade in front of the limbs of the male only, which, it may be, is intended merely for shadow. The lobes of hair pendent from the sides of the lower jaw are whitish, and the fringe down the front of the neck is coloured dusky-black, being not very long, and projecting so as to form an obtuse point or angle opposite the lower part of the neck, exactly as in the Moufflon of Corsica. The female has not

A full grown pair of horns measure $32\frac{1}{2}$ inches over the curvature, and 11 inches round at base; their widest portion apart, measured outside, is 2 feet, the tips converging to 8 inches, and span from base to tip also 8 inches: they are subtriangular, much compressed laterally, the anterior surface $2\frac{3}{4}$ inches broad at base, with its side-angles about equally developed, and the posterior part of the section tapers rather suddenly to a somewhat acute angle; eight years of growth are very perceptible, which successively give 12, 7, 4, 3, 3, $1\frac{1}{2}$, $1\frac{1}{2}$, and $\frac{1}{2}$ inches; they bear considerable resemblance to those of the Moufflon Sheep, but differ in being very much larger, and in the circumstance of the outer front-angle being as much developed as the inner one, and they have not the slightest tendency to spire, but describing three-fourths of a circle, and originally diverging as in a common Ram, they point towards the back of the neck, somewhat as in *O. Tragelaphus*. Another and younger specimen, however, has a decided spiral flexure outward, more especially towards the tip, and has also the outer angle much less developed than in the corresponding terminal portion of the former. This pair had grown to 11 inches long, with the tips $14\frac{1}{2}$ inches apart; only one year's growth, and that apparently incomplete, is however exhibited, and the curvature is likewise less than in the older specimen. The portion of skull attached is also so much smaller, that I think it prudent to hesitate in identifying it as specifically the same. The posterior margins of the orbits are but $4\frac{1}{2}$ inches apart, whereas in the other they are $5\frac{1}{2}$ inches. There are no materials for extending the comparison, but a few more dimensions may be given of the smaller one. The greatest width of this skull at the posterior portion of the zygomæ is 5 inches, and the orbits are $3\frac{1}{4}$ inches distant where most approximated: the series of 5 developed molars occupied $2\frac{3}{4}$ inches; width of second true molars apart, posteriorly and externally, $2\frac{1}{4}$ inches; of anterior false molars, measured outside and before, $1\frac{1}{8}$ inch;

any trace of this lengthened hair, and is represented with very short horns, indicating that the individual was probably young.

Mr. Vigne's coloured portrait represents a much younger male than that figured by Sir Alexander Burnes, and I should say in winter vesture: the same gentleman had also a coloured figure upon a large scale of the head of a still younger specimen, which was coloured similarly to the other, or of a livid hue, without any white muzzle. I possess copies of both figures.—E. B.

greatest width of palate, $1\frac{3}{4}$ inch, and from front or first false molar to anterior portion of occipital foramen, $5\frac{3}{4}$ inches. Mr. Vigne, indeed, assures me, that the adult has only five grinders on each side of both jaws, as in the Chirew, which, if normal, would make an important distinction, as the smaller specimen would undoubtedly have developed a third true molar, and possesses three false ones; whereas it is in one of the latter that the Chirew is deficient. I am inclined, however, to regard the two specimens as belonging to the same species, since I have observed analogous differences in the mere flexure of the horn in different Corsican Moufflons; but it was at all events proper to indicate the disparity.*

Vast numbers of this species," relates Mr. Vigne, "are driven down by the snow in winter to the branches of the Indus, near Astor, at the southern extremity of Little Tibet, where the river breaks through the chain of the Himalaya. I once saw a young one, apparently of this species, in Persia, but took no memorandum of it at the time; it was dirty and draggled, but, I think, was covered with short wool." I have great pleasure in dedicating this species to that gentleman.†

* Five skulls, with the horns, of adult males, are now before me, together with some loose horns, which enable me to decide that the above animals were the same in species; it is very rarely, however, that the outer front-angle of the horn does not quite equal the inner one; the extreme length of skull, from vertex to tip of intermaxillaries, is $8\frac{3}{4}$ inches, and greatest breadth $5\frac{1}{2}$ inches; length of bony palate $4\frac{1}{2}$ inches. The series of molars consists, as usual, of three true and as many false molars.—E. B.

† The *Ovis Vignei* is extensively diffused upon the various ramifications of the Hindoo Koosh, inhabiting Pamir on the north-east, the Sulimani chain of mountains on the south, and westward the ranges of the Elboorz, which skirt the southern extremity of the Caspian Sea. At least I judge this to be the species mentioned in Mr. Fraser's 'Winter Journey from Constantinople to Tehran,' (vol. i. pp. 153, 155, and 159,) as being very numerous upon a mountain near Shahrood. This traveller notices, "The wild mountain Sheep and Goats. The male of the former is a noble animal, with a curly neck, and mane that would become a Lion [winter coat?], and prodigious curling horns; the latter [probably *C. Ægagrus*] has immense horns curving backwards. These mountain Sheep and Goats, warned by their sense of smell, were making off from our vicinity, at more or less speed, to places where they might be secure; there they would stand still upon some point or slab of rock, resembling it so nearly in colour as scarcely to be distinguishable without a glass." Again, further to the eastward, "a noble mountain Sheep" is mentioned (at p. 399); and "The wild Sheep and the wild Goat" are stated by the Hon. Mountstuart Elphinstone to be common on the eastern hills of Afghanistan.

In the latter country, Capt. Thos. Hutton has more recently observed the *O. Vignei*, and supposing it undescribed, proposes for it the provisional name *O.*

11. *O. Musimon*, Linnæus.—The Moufflon Sheep of Corsica and Sardinia, but not, there is reason to suspect, of the Levantine countries. It is unnecessary to give a detailed description of this beautiful little species, though I may mention that the fine living male in the gardens measures 39 inches from nose to tail; the tail 5 inches; from nose to base of horn 7 inches; ears 4 inches; neck, from posterior base of horn to the abrupt angle of its insertion, 8 inches, and thence to base of tail 21 inches; height at the shoulder $2\frac{1}{4}$ feet. The horns of this individual are remarkable for not spiring in the least degree, whence they point towards the back of the neck: they measure 21 inches over their curvature, and $8\frac{1}{4}$ inches round at base, being in their fifth year of growth; their widest portion apart is 15 inches, and at the tips 6 inches; but another pair, upon the stuffed specimen in the Museum,

cycloceros, "from the circular position of its horns." (*Extract from a letter dated Candahar, 12th September, 1840, published in the Calcutta Journal of Natural History, No. iv. p. 557.*) This gentleman thinks it will prove to be the proper "Bearded Sheep" of Pennant, and there is little or no doubt he is right so far as regards the imperfect skin purchased by Pennant in Holland, and which that naturalist was informed "came from the East Indies;" but Pennant erroneously identified this skin to be of the same species as the Barbary animal, (*O. Tragelaphus*,) and mixes up the two in his description. The figure he refers to, also, as taken from the living animal in Paris, and of which a copy is given by Shaw, (if I mistake not, a little embellished about the cheeks and chin,) appears to me to represent a Corsican Moufflon, (*O. Musimon*,) the hoofs of which had grown out of a state of protracted confinement, as commonly enough happens with captive ruminants.

Compare Mr. Fraser's notice with that of Lieut. Wood, of a specimen of the "*Kutchgar*" of Pamir: this author states, "It was a noble animal, standing as high as a two year's old colt, with a venerable beard, and two splendid curling horns, which, with the head, were so heavy, as to require considerable exertion to lift them. Though in poor condition, the carcass, divested of its offal, was a load for a baggage pony; its flesh was tough and ill-tasted, but we were told that in autumn, when this animal is in prime condition, no venison is better flavoured. The *Kutchgar* is gregarious, congregating in herds of several hundreds. They are of a dun colour, the skin more resembling the hide of a cow than the fleece of a [tame] Sheep. A skeleton of this animal, and several complete crania, were deposited, I believe, at Loodiana." The latter are now before me, or (as in a note to Taylor's reprint of this memoir,) I should have been tempted to refer the foregoing notice to *O. Polii*. Whereas the carcass of *O. Vignei*, however, "divested of its offal, is a load for a baggage pony," Sir Alexander Burnes was informed, respecting the "*Rasse*," that "a common sized specimen will require two horses to bear its flesh from the field," and the latter is moreover reported to be of a white colour. Capt. Hay remarks, that the present species is "gregarious in flocks of about forty, headed by an old male." A stuffed specimen, I am told, exists in the Museum of Paris.—E. B.

which shew the more usual [?] slight spirature are 26 inches long, having their widest portion 14 inches apart, and the tips as much as 12 inches : this pair shews seven years of growth, and their development was evidently completed, though they are only 7 inches in girth at base. The female has seldom any horns, which, when they exist, are ordinarily about 2 inches long.

The character of the horn of the Moufflon is nearly the same as that of the domestic Ram, only that it is never so much prolonged, nor indeed to more than two-thirds of a circle : the inner front edge is acute to near the base, where the outer one approaches to an equality with it ; the first half being thus unequally triangular, and the remainder much compressed, with strongly marked rugæ, and having the inner surface of the horn concave. It has always appeared to me, however, that the specific distinctness of the Moufflon is very obvious, and I doubt whether it has contributed at all to the origin of any tame race. That it interbreeds freely with the latter, under circumstances of restraint, is well known ; but we have no information of hybrids, or *Umbri*, as they are called, being ever raised from wild Moufflons, though the flocks of the latter will occasionally graze in the same pasture with domestic Sheep, and all but mingle among them. The male of this animal is denominated in Corsica *Mufro*, and the female *Mufra*, from which Buffon, as is well known, formed the word ‘Moufflon ;’ and in Sardinia the male is called *Murroni*, and the female *Murva*, though it is not unusual to hear the peasants style both indiscriminately *Mufon*, which, (as Mr. Smyth remarks in his description of that island,) is a palpable corruption of the Greek *Ophion*. It is sometimes stated, but I do not know upon what authority, that a few of these animals are still found upon the mountains of Murcia.*

* I am not aware that the winter dress of the Moufflon has ever been described. In summer the coat presents a smooth surface, with the hair in front of the neck but moderately elongated, and lying close, though projecting so as to produce an obtuse angular outline opposite the lower part of the neck, where it is longest. The general colour is bright rufous brown, with a triangular white saddle-like mark on each side ; the head is dusky, with a white muzzle, and darker chaffron ; the belly and limbs below the mid-joint are also white, with generally dark markings in front of the latter, more or less developed ; and there is a conspicuous white disk surrounding the tail, but not ascending above it (as in the Argali ;) the lengthened hair in front of the neck is black, as also a lateral band bordering the white belly, together with the outside and inside of the upper half of the fourlimbs, the tail, and

12. The *Cyprian Moufflon*, figured and described by Messrs. Brandt and Ratzeburg from a specimen in the Berlin Museum, and contrasted by them with M. F. Cuvier's figure of the Corsican animal, is probably a distinct species, intermediate to *O. Musimon* and *O. Gmelini*; its

a median line over the forequarters terminating at the white saddle: the female is much less rufous, with the dark markings less developed, and no white patch on the sides.

In winter, there is a considerable admixture of black about the body; the hair upon the nape, and especially the withers, is much elongated, forming a very conspicuous mane when it does not fall over on one side; that on the under or forepart of the neck is also of considerable length, and projects forward in a peculiar manner, being directed upward from the chest, and downward from the upper portion of the fore-neck; but the most remarkable feature consists in what in summer merely forms the triangular white patch on the sides, which is then even with the rest of the coat, whereas in winter dress this forms a whorl of very much lengthened white hair protruding far beyond the rest, and imparting a singular appearance to the animal when viewed otherwise than laterally. I have observed the same character in a woolly domestic Sheep, which was brought from one of the West Indian islands, in which case the whorl of white hair projected beyond the rufous wool.

The Moufflon is a very brisk, energetic animal, rather powerfully made, and strong about the neck, but appearing more so from the length of the hair in front of that part, which in winter may be termed shaggy; the wool beneath its hair is much more copious than in the wild Sheep generally. Its pace is a fleet canter, all lightness and agility; but (as Azuni remarks) it is soon fatigued when pursued over level ground, though from their nimbleness they can seldom be approached in their native wilds. There they bound with surprising vigour, "jumping from rock to rock at the distance of many feet, and if hard chased to the extremity of a cliff from whence it can reach no other, it will throw itself over, and with astonishing agility pitch upon its horns, without receiving any hurt."—(Boswell's Corsica, p. 41.) The same is stated of *O. Tragelaphus* in Jackson's 'Account of the Empire of Morocco.' This animal inhabits the wilds of Corsica and Sardinia, and never quits the highest ridges, where the temperature however does not allow of permanent snow. In general they live in small herds, headed by an old male, but unite occasionally into flocks of a hundred or more, which separate again when the rutting season commences, and the usual battles have decided how many females each male can retain. The females yearn two lambs in April and May. When brought up tame, the adult male is a capricious and violent little animal, ever ready to butt at strangers the moment their back is turned, or they look for an instant in another direction. I have seen one run at and butt against a post again and again, merely for amusement; and when grazing, it often rubs the herbage violently with its horns, which it makes full use of on all occasions. It is active, curious, impudent, and lascivious, perfectly fearless, and propagates readily with the domestic Sheep, though only under circumstances of restraint, (as noticed in the text.) Azuni and other authors notice their flesh to be equal to the finest mutton; and the mountaineers are said still to convert their skins into vests, and a kind of cloak, which, it has been remarked, may be the present representatives of the *Mastruca Surdorum*, noticed in the commentaries on Cicero, as made from the skin of the Moufflon. This dress was worn in particular by the inland robbers, the *Mastruca latruncule*.—E. B.

horns have more the curvature of those of the latter species, but are not so robust, and curve round gradually backward from the base, instead of at first diverging straightly, as in *O. Gmelini*; but the colour of the coat would appear to resemble that of the Corsican Moufflon, only without the rufous cast, and the specimen figured wants also the saddle-like triangular white patch, which I suspect is never absent in the Moufflon of Sardinia and Corsica. The *Tragelaphus* of Belon, it is true, observed by that author in Candia and in Turkey, is described by him to have "horns similar to those of Goats, but sometimes gyrate like those of a Ram;" yet the fact of a nearly similar flexure of horn to that represented by Messrs. Brandt and Ratzeburg proving to be of normal occurrence in the allied Armenian wild Sheep, confers additional probability on the supposition that the Berlin specimen of the Cyprian Moufflon has also normally curved horns, which alone would go far to establish its claim to rank as a species, in which case it might bear the appellation of *O. Ophion*.*

13. *O.—Ixalus Probaton*, Ogilby.—I stated in my former paper an opinion, to which I am still disposed to adhere, that this animal is no other than a genuine Sheep, but specifically distinct from any at present known: the specimen had long lived in captivity, as is obvious from the manner in which its hoofs had grown out; but whereas I formerly sought to account for its absence of horns, by ascribing this to probable castration at an early age, I am now inclined to consider that this abnormality, for such there is every reason to suppose it, was individually congenital, as in other rare cases before alluded to. The Armenian wild Sheep approaches more nearly to this species than any other as yet discovered; so much so, that before actually comparing them, I thought that they would prove to be the same; but they are nevertheless distinct, as is particularly shewn by the longer and less

* It is worthy of notice that the Cyprian animal bears about the same relationship to the Corsican Moufflon, which *O. Gmelini* does to *O. Vignei*. It is therefore, also, probably distinct. In an original description of the island of Milo, published in the Penny Magazine, (No. 136,) we read that, on Mount St. Elias, "still higher up, the surface was broken into fine bold crags, among which we were told that, as in Candia, and one or two of the larger islands of the Archipelago, the Moufflon is still to be found. We, however, certainly saw nothing of the sort; and on enquiring afterwards of some of the old inhabitants, we did not receive very satisfactory assurances that they had ever seen any."—E. B.

slender tail of the present animal, and the very different texture of its coat ; the absence of dark markings on its face and limbs may prove to be an individual peculiarity. The specimen is of the size of a large tame Sheep, and entirely of a chestnut-fulvous colour, dull white beneath and within the limbs, also on the lips, chin, lower part of the cheeks, and at the tip of the tail. From nose to base of tail it measures about fifty inches, the tail half a foot, and height of the back two feet and a half. From nose to rudiment of horn nine inches, and ears four inches : the vestiges of horns, which exactly resemble those found upon many breeds of tame Sheep, are two inches apart. Upon the minutest examination of the specimen, I can perceive no character whatever to separate it from the genuine Sheep, nor any distinction more remarkable than the trivial circumstance of its chaffron not being bombed, as usual, which however is equally the case with *O. Tragelaphus*. I have been favoured, however, by Colonel Hamilton Smith, with a drawing of an animal observed by himself on the banks of the Rio St. Juan in Venezuela, which appears to accord so nearly with *Ixalus Probaton*, except in the particular of bearing horns similar to those of the Rocky Mountain Goat, that its absolute identity is probable, in which case it would be curious that a species so very nearly allied to the genus *Ovis*, should yet differ from it so considerably in the character specified. The South American animal adverted to, is the *Aploceros Mazama* of Colonel Smith, and is probably congeneric with the *Pudu* of the Chilian Andes, mentioned by Molina, (the existence of which would appear to have been lately re-ascertained by M. Gay,) and also with the fossil *Antilope Maquignensis* of Dr. Lund : there would indeed appear to be other living species of this type, more or less distinctly indicated by different authors.

14. *O. Aries*, Linnæus, the Domestic Sheep.—Assuming that different species have commingled to produce this animal, as appears to be very evident in the instance of the Dog, it is still remarkable that we have certainly not yet discovered the principal wild type, nor indeed any species with so long a tail as in many of the domestic breeds, which I cannot doubt existed also in their aboriginal progenitors : nothing analogous is observable among the endlessly diversified races of the Domestic Goat, which all appear to have been derived exclusively

from the Caucasian *C. Ægagrus*; and as in my former paper I suggested the probability that a wild Sheep more nearly resembling the domestic races than any hitherto discovered, would yet occur somewhere in the vicinity of the Caucasus, it now appears that such an animal does exist in Central Persia, as noticed in my description of *O. Gmelini*: nor should it be forgotten, that Hector Boetius mentions a wild breed in the island of St. Kilda, larger than the biggest Goat, with tail hanging to the ground, and horns longer and as bulky as those of an ox.* Pennant remarks upon this subject, that such an animal is figured on a bas-relief taken out of the wall of Antoninus, near Glasgow.

Of all the wild species of true *Ovis* that have been here described, the Rass of Pamir approaches nearest to *O. Aries* in the character of its horns, though differing in one particular besides size, that has been pointed out, namely, that the two front angles are about equally developed, whereas in *O. Aries*, as in the Moufflon, the inner angle is more acute to near the base. Some experience in the deduction of the specific characters of Sheep horns enables me to state with confidence, that the character of the long-tailed domestic breeds of Europe, and also of most other breeds, is intermediate to that of the Rass and that of the Moufflon, combining the flexure and the prolongation of the former with the section of the latter, but becoming proportionally broader at the base than in either; more as in the Argalis of Siberia, Kamtschatka, and North America. That *O. Aries* is totally distinct from all, I have been long perfectly satisfied, and examination of the Rass in particular has strongly confirmed me in this opinion. I think it likely, however, that more than one wild species have commingled to form the numerous domestic races, though certainly not any that have been described in this paper. It is not very long since the question was habitually discussed, whether

* Two crania of Sheep, apparently male and female, from the Irish peat, in the possession of the Earl of Enniskillen, and exhibited sometime ago at a meeting of the Geological Society, are probably of this race.

Here I may mention, that among the numerous valuable fossil remains from the Sivalik deposits, presented to the Asiatic Society by Colonel Colvin, (as noticed in the Journal of the Society, vol. v. p. 183), I have determined a large fossil Sheep (allied to, if not identical with the Argali), a fossil Ibex, which I shall take an early opportunity of figuring and describing.—E. B.

the tame Sheep has descended from the Argali of Siberia, or the Moufflon of Corsica; and now that so many more indisputably distinct wild species have been added to the catalogue of this genus, it is probable that we are still far from having ascertained the complete existing number; but that several more yet remain to be discovered upon the lofty table-lands and snowy mountains of middle Asia, from the Caucasus and Taurus to the Altai, and among them, it is very probable, some much more nearly allied to the domestic races than any at present known.

The whole of the foregoing animals appertain to my subgeneric group *Ovis*, as distinguished from *Ammotragus*, which latter is characterized by the absence of suborbital sinuses, like the Goats, but differs from the latter by possessing interdigital fossæ, as in other Sheep. This difference between the Goats and Sheep appears to have been first noticed by Pallas, and has since been descanted upon by Professor Gén  in vol. xxxvii. of the 'Memorie della Reale Accademia delle Scienze di Torino.' The fact of such a diversity in genera so nearly allied in habitat as the Goats and Sheep, renders the problem of the utility of the structure in question somewhat difficult of solution. The species upon which I found the subgenus *Ammotragus*, has decidedly an Ovine, rather than a Caprine, aspect, when viewed alive; the male emits no stench, as in the Goats; the bleat is precisely that of *Ovis*; and the animal butts like a Ram, and not like a Goat. Unlike the other species of admitted wild Sheep, as well as the long-horned or true wild Goats, it has a concave chaffron, and no markings on the face and limbs: its tail is rather long, which is the case in no species of *Capra*, and is also remarkable for being tufted at the extremity. The indigenous habitat, North Africa, is a further peculiarity in the genus in which it is here placed, though two species of wild Goats respectively inhabit Upper Egypt, and the snowy heights of Abyssinia.

15. *O. Tragelaphus*, Pallas, the African Goat-sheep.—This animal appears to vary considerably in size, some exceeding a Fallow Deer in stature, while others are much smaller. It has no beard on the chin, like the true Goats, but is remarkable for the quantity of long hanging hair in front of the neck, and on the upper part of the fore limbs, the former attaining in fine males to about a foot in length,

and the latter to nine inches; there is also some lengthened hair at the setting on of the head, and a dense nuchal mane, the hairs of which are three inches long, continued over the withers till lost about the middle of the back. General colour tawny, or yellow-brown; horns moderately stout, turning outwards, backwards, and so inwards, with the tips inclining towards each other.

The splendid male in the British Museum measures 5 feet from nose to tail, and tail 9 inches, or with its terminal tuft of hair 13 inches; height of the back $3\frac{1}{2}$ feet, but the living animal would not have stood so high by some inches; from muzzle to base of horn 11 inches, and ears 5 inches. The finest pair of horns which I have seen are in the same collection, and measure 25 inches over the curvature, $10\frac{1}{2}$ round at base, with an antero-posterior diameter of $2\frac{1}{2}$ inches inside; they diverge to 23 inches apart, measuring outside, at a distance of 6 inches from the tips, which latter return to 15 inches asunder; their span from base to tip inside is 13 inches: at base they are closely approximated, but not quite in contact. General form subquadrangular for nearly a foot, then gradually more compressed to the end, and having a very deep longitudinal furrow for the greater portion of their length outside, above which the horn bulges: there is a mark of annual growth at $1\frac{1}{4}$ inch from the base, another $1\frac{1}{2}$ inch further, and a third after an interval of 3 inches; but the rest are too indistinct to be made out with certainty among the wrinkles of the horn. A large pair of female horns were 16 inches long; $7\frac{1}{2}$ round at base; their widest portion apart, near the tips, 19 inches; and the tips $17\frac{1}{4}$ inches: their surface is marked with broad transverse indentations, which in the males ordinarily become more or less effaced with age. The female of this species is a third smaller than the other sex; and a lamb in the collection of this Society is extremely kid-like, with the spinal mane upon the neck and shoulders very conspicuous, but no lengthened hair on the fore-neck and limbs; in the half grown male, the latter especially is still not much developed.

This species is well known as the *Aoudad* of the Moors, and the *Kebsh* of the Egyptians; it is also, according to Rüppell, the *Tedal* of the inhabitants of Nubia, which is doubtless the same as *Teytal*, applied by Burckhardt to the Wild Goat of that region, in addition to the word *Beden*, which (in common with Rüppell and others) he also as-

signs to the latter. Sir Gardner Wilkinson, however, confirms Burckhardt by informing us, that the Goat referred to is called in Arabic *Beddan*, or *Teytal*, the former appellation referring to the male only. This author adds, that the present species "is found in the eastern desert, principally in the ranges of primitive mountains, which, commencing about lat. $28^{\circ} 40'$, extend thence into Ethiopia and Abyssinia." According to M. Rüppell, "it is found in all North Africa above 18° , in small families, and always upon the rocky hills;" frequenting the steepest and most inaccessible crags amid the woods and forests of the Atlas, and descending only to drink. It is a wonderfully agile leaper, even more so than the wild Sheep and Goats generally, and is remarkable for always browsing in preference to grazing. The *Ovis ornata*, figured by M. Geoffroy in the great French Work on Egypt, would appear to be merely a small sized individual.

The following may serve for definitions of the various ascertained species of Wild Sheep that have been here described:—

O. Polii, Blyth. *O. cornibus maximis triquetris, angustis altissimis; angulis anterioribus equalibus: extrorsum spiraliter gyratis, et tam prolongatis quam sunt cornua Arietum domesticorum longissima: sulcis transversim indentatis; colore pallido. Animal non cognotum est, sed O. Ammoni magnitudine saltem haud inferius. Habitat apud planitiem elavatam Pamir dictam, in Asia centrali.*

2 *O. montana*, Desmarest.—*O. cornibus maximis triquetris, crassissimis, et sæpe inter angulos tumidis, ad apicem compressoribus; sulcis transversim indentatis; deorsum et antrorsum gyratis ad parallelum, apicibus extrorsum eductis; colore pallido, sed sæpe rufo-brunneo suffuso. Animal ad magnitudinem Cervi Elaphi appropinquans, sed artubus brevioribus; pilis griseo-fulvis pallidis, maculis genericis super facie, pectore, artubusque fuscis; caudâ brevissimâ, et disco albescente circumdatâ. Habitat apud Americæ septentrionalis montes occidentalem versus.*

3. *O. Ammon*, Pallas.—*Diversitas hujus speciei ab præcedente non cognota est, quamvis patria differt, hæc in Siberiâ Orientali habitante; tertia alia species ambobus distincta regione intermediâ Kamtschatkæ invenitur, itidem simillima, tamen (apparenter) facillimè dignoscenda; viz.*

4. *O. nivicola*, Eschscholtz.—*O. cornibus triquetris*, et inter *cornua Polii* et *Montanæ* *Ovium* apparenter intermediis; apicibus magis prolongatis quam in *O. montanæ*, sed ad basin crassioribus; potius quàm in *O. Polii* prolongatis, sed cornibus utriusque minoribus. Magnitudo hujus animalis inferior est, et pilorum color flavescens, sine disco caudali. Habitat apud montes Kamtschatkæ.

5. *O. Californiana*, Douglas.—*O. cornibus crassis triquetris*, ad apicem compressioribus; sulcis transversim indentatis; curvamine aperto extrorsum (non antrorsum) gyranibus, apicibus plurimum extrorsum ductis; colore pallido, aut rufo-brunneo paulum suffuso. Magnitudo Ammonis vel paulum inferior: caudâ elongatâ, et non (?) disco pallido circumdatâ. Habitat apud Californiam, et regionem proximam Americæ continentis.

6. *O. Nahoor*, Hodgson.—*O. cornibus crassis subcylindraceis*, suprâ magis planiusculis, culmine abruptiore medio, dimidio-distali compressiori, et extrorsum arcuatis, apicibus retortis: sulcis transversis obsoletis; colore pallido. Magnitudo Arietis grandis; pilis griseis, vel in junioribus adultis fulvo terminatis, maculis genericis fuscis; caudâ brevi et floccosâ. Habitat apud regiones medias montium Himalicorum, et in Tibeta Magnâ.

7. *O. Burrhel*, Blyth.—*O. cornibus crassis subcylindraceis*, supra convexioribus, culmine longitudinali minus abrupto, et aliis angulis minus prominentioribus quàm in specie præcedente, subequalioribus; in arcu extrorsum curvatis, apicibus retrorsis; sulcis transversis obsoletis; colore nigrescenti-rubido. Magnitudo inferior est *Nahoori*, sed forma robustior; pilis castaneo-brunneis intensis; maculis genericis nigris et distinctis; caudâ minimâ (?) et non floccosâ. Habitat apud montium Himalicorum regiones summas.

8. *O. cylindricornis*, Blyth.—*O. cornibus maximis cylindraceis*, in arcu extrorsum (?) sine diminutione curvatis, apicibus non cognitis; sulcis transversis obsoletis: colore nigrescenti-rubido. Habitat apud Caucasum.

9. *O. Gmelini*, Blyth.—*O. cornibus triquetris et robustis, altis, et transversim sulcatissimis*; in arcu retrorsum divergentibus, apicibus introrsum ductis; colore pallido. Magnitudo Arietis; pilis brevissimis, et castaneo-fulvis splendide coloratis; maculis genericis subdis-

tinctis, sed lineâ pilorum longiorum nigrâ infra collum in mare solo excipiendâ, apud pectore se expandente, et in utroque sexu cæsarie rudimentâ brachiis, sicut in *Ove Tragelapho*: caudâ brevi et gracillimâ. Habitat apud Armeniam, et provincias Occidentales Persiæ septentrionalis.

10. *O. Vignei*, Blyth.—*O. Musimoni* simillima, sed magnitudine *Cervi Damæ* grandis æquans, artubusque longissimis: cornibus robustis, compressis, et subtriquetris, angulis anterioribus equalibus; lunatim non spiralliter gyratis; et sulcis transversim indentatis: colore pallido. Corporis pilis rufo-brunneis; facie artubusque lividis; ventre, et annulis supra ungulas albis; lineâ laterali nigrâ, pedibus annulo secundo nigro anticè albo super marginato notatis; apice caudæ (brevis et gracilis,) et lineâ pilorum paulum pendentium infra collum medium ad pectus tendente, nigris. Habitat apud Asiam centralem—Varietas cornibus extrorsum gyratis, cum angulo interiori prominentiori.

11. *O. Musimon*, Linnæus.—*O.* cornibus compressis, ad basin triquetrioribus, angulo interiori prominentiori; lunatim gyratis, et sulcis transversim indentatis: colore pallido. Magnitudo Arietis parvi, caudâ brevi et magis villosâ: pilis rufo-brunneis; facie lividâ cum capistro, ventre, clunibus, dimidiisque artum inferioribus, albis; et lineâ laterali, caudâ, pectore, et membrorum plerumque dimidiis superioribus, nigris: maculâ triangulari alba utroque lumbis conspicuâ. Habitat apud insulas Corsicæ et Sardiniae, et forsâ provinciam Murciæ in Hispaniâ.

12. *O. Ophion*, Blyth.—*O. Musimoni* simillima, sed cornibus retrosis, apicibus accurvatis: pilisque brunneis, et non rufescentibus (?) Habitat apud Cyprum, et forsâ regiones alias Levantinas.

13. *O. Aries*, Linnæus.

14. *O.* — ? *Ixalus Probaton*, Ogilby.—Magnitudo Arietum maximorum, caudâ paulum elongatâ, cornibus in specimine solo cognito abnormaliter (?) rudimentalibus, pilis castaneo-fulvis, et infra albescentibus.

15. *O. (Ammotragus) Tragelaphus*.—*O.* cornibus magnis subquadrangularibus, moderatè crassis, ad apicem compressioribus, sulcis transversim indentatis; divergentibus et retrorsum curvatis, sed prope basin rectis, apicibus acclinatis; colore pallido. Magnitudo *Cervi Damæ* superior, pilis flavescenti-brunneis; collo jubato, et infra

cum pectore brachiisque capillato, caudâ elongatâ extremitate villosâ; facie non convexâ—ut in omnibus speciebus aliis, sinibusque suborbitalibus nullis. Fæminâ semper (?) cornutâ, cornibusque fortioribus quàm in fæminis specierum hujus generis cæterarum, quæ sæpe non cornutæ sunt, sed plurimæ cornua parva, tenuissima, et compressiora ferunt, quæ in maribus junioribus aut curvata sunt, aut sæpe rectiora. Habitat apud Africæ septentrionalis montes rupestres.

A connected view of the species of Lichens, with their Botanical relationship existing between them and the Indian productions. By
HENRY COPE, ESQ.

HENRY TORRENS, ESQ.

Secy. Asiatic Society.

DEAR SIR,

As many of the Lichens which are indigenous to the Himalayan range, are closely allied by generic or (less proximate) family characters to the different species which have been used in Europe in the arts, or as articles of food for men or animals, it may perhaps be useful to present to the Society and those of its Members, who are interested in the subject, a connected view of those species, as the Botanical relationship which exists between them and the Indian productions, may lead to further investigation. I am indebted to Sir W. J. Hooker's sequel to the English Flora, for the chief portion of what I have now the honor to submit.

The Lichens of England, which with those of Europe generally, have even a closer affinity as regard their Botanical characters with those of the Himalayas, than the more conspicuous portions of vegetable productions, are divided by Hooker into seventeen families, comprising thirty-nine genera, of which eleven are distributed through seven families, exhibit species useful to man or beast; and it is an interesting fact that of these eleven, five belong to our family, the *Umbilicariæ*, and that to this same family appertain the species most frequently found in the Himalayas.

As, however, Dr. Hooker's notes will be more interesting than any observations of mine, I shall proceed at once to extract them, commencing with

Variolaria faginea, Pers.

The intensely bitter taste of this Lichen, according to Messrs. Turner and Borns, distinguishes it from every species hitherto discovered. It is upon this circumstance, which we have never found to vary, that we have been induced to place our chief reliance in making *V. faginea* and *discoidea* distinct. Mons. Braconnot detected in this and several other crustaceous Lichens, oxalic acid; in the present plant in such abundance, that 100 parts yielded 18 of lime, combined with 29.4 of oxalic acid, nearly the same quantity in other crustaceous Lichens, and he remarks, that oxalate of lime bears the same relation to the *Cryptogamia*, as carbonate of lime to corals, and phosphate of lime to the bony structure of the more perfect animals. It diminishes, however, in the family of Lichens in proportion as the species lose their general crustaceous texture, and approach more and more to the membranous or cartilaginous, although the latter also contain a considerable portion of salt. M. Braconnot strongly recommends the adoption of *V. faginea* in the production of oxalic acid, and an eminent French chemist now informs me, that it is so employed in France, and upon a very extensive scale.—*English Flora*, vol. v. p. 169.

Note.—Dr. Royle notices numerous species of crustaceous Lichens as indigenous to India generally, and as found both on rocks and trees; they belong to the genera *Lecanora*, *Lecideæ*, *Lepraria*, *Verrucaria*, &c.—*Illustrations* vol. i. p. 437.

Lecanora Parella, Ach.

This is the Parelle of Auvergne and other parts, where it is extensively employed to produce a dye far superior to that of the Cudbear, and quite equal to that of the Archil.—*English Flora*, vol. v. p. 191.

Note.—The Parelle which grows chiefly on basaltic rocks, is inferior to *Roccella tinctoria*, (Archil,) in not bearing ebullition, and has the disadvantage of not answering with alum, which destroys the colour.—*Ure's Dictionary of Arts*, p. 52.

Lecanora tartarea, Ach.

This is the famous Cudbear, (so called after a Mr. Cuthbert, who first brought it into use,) employed to produce a purple for dyeing woollen yarn, and nowhere perhaps used to so great an extent as in the manufactory of Mr. MacIntosh of Glasgow. This gentleman imports it largely from Norway, where it grows more abundantly than with us; yet in the Highland districts, many an industrious peasant gets a living by scraping off this Lichen with an iron hook and sending it to the Glasgow market. When I was in the neighbourhood of Fort Augustus some years ago, I was

informed, that a person could earn 14s. per week at this work, selling the material at 3s. 4d. the stone of 22lbs. The fructified specimens are reckoned the best.

A remarkable and fructified state of this plant, as it appears to me, is imported by Mr. MacIntosh from Sicily, with the crust singularly thick, and formed into warts so exceedingly elongated and cylindrical, that they appear like the podatia of an *Isidium*.—*English Flora*, vol. v. p. 191.

Note.—The *Lichen tartareus* dyes crimson red. In Jutland, *Cudbear* is made from it by grinding the dry Lichen, sifting it, then setting it to ferment in a close vessel with ammonia. The Lichen must be the third year's growth to yield an abundant dye, and that which grows near the sea is best. It loses half its weight by drying. A single person may gather from 20 to 30lbs. a day in situations where it abounds. No less than 2,239,685lbs. were manufactured at Christiannsund, Flekkefiort, and Fahrsund in Norway, in the course of the six years previous to 1812. [This gives an average of 166 tons per annum, which at the then market rate of £60, or upwards, yields a sum of £9,960, as the yearly proceed accruing from the sale of a plant, which its appearance would lead the casual observer to consider as worthless.—H. C.]—*Ure's Dictionary*, p. 53.

Parmelia saxatilis, Ach.

In Scotland is collected abundantly by the peasantry with *P. omphalodes*, to dye woollen stuffs of a dirty purple. It grows on trees, rocks, and stones, especially in mountainous districts.

Note.—The principal species of *Parmelia*, which I have sent for examination is very likely the *P. perforata*, the very next species in the *English Flora* to the above two.—H. C.

Peltidea aphthora, Ach.

This is the finest British species of the genus. It derives its name from a circumstance related by Linnæus, that the Swedish peasants boil it in milk as a cure for the aphthæ or thrush in children.—*English Flora*, vol. v. p. 215.

Peltidea canina, Ach.

Formerly employed at the suggestion of Dr. Mead as a cure for the bite of a mad dog, whence the specific name.—*English Flora*, vol. v. p. 215.

Note.—Dr. Royle mentions this Lichen in his Illustrations as having been found in the Choor.—*Vol. i. p. 437*.

Gyrophora.

Various species of this genus, (and they are found in cold rocky situations, especially on granite in almost all parts of the world,) con-

stitute the *Tripe de Roche* of the Canadians, and with *G. proboscidea*, *G. villeda*, and a few other American species, Capt. Sir J. Franklin and his brave companions were supported in Arctic America during a season of want, such as happily few human beings have been subjected to. They are, however, bitter and nauseous, and can only be employed in the total absence of every other salutary food.—*English Flora*, vol. v. p. 217.

Note.—Berzelius has proposed removing the bitter principle of these Lichens, by macerating them in a weak solution of carbonate of potass, (one part to three hundred of water,) and afterwards washing them in cold water. This bitter principle has been called *Cetraria*, and imparts tonic properties to several of the species, as to *Borrera furfuracea* and others, which have been used for the same purpose as *Cetraria Islandica*, and some have been employed as a substitute for hops in the brewing of beer.—*Royle's Illustrations*, vol. i. p. 438.

Gyrophora Cylindrica, Ach.

Is used in Ireland occasionally as food, and more frequently for dyeing woollen cloth of a brownish green colour.—*English Flora*, vol. v. p. 218.

Cetraria Islandica, Ach.

Although this plant is abundant in certain districts of Scotland, it has never with us been collected as an article of commerce. A considerable proportion of what comes to our shops, where it is in great request as a medicine in coughs, consumptions, &c. is procured from Norway and Ireland. Immense quantities are gathered in the latter country, not only for sale, but for their own use as an article of common food; the bitter and purgative quality being extracted by steeping in water. The Lichen is then dried, reduced to powder, and made into a cake, or boiled and eaten with milk, and eaten with thankfulness too by the poor natives, who confess "that a bountiful Providence send them bread out of the very stones."—*English Flora*, vol. v. p. 271.

Note.—The starchy substance which renders the *C. Islandica* nutritive and demulcent, is called *Lichenin*.—*Royle's Illustrations*, vol. i. p. 438.

Rocella tinctoria, DeCand.

This interesting Lichen is the famous Archill or Orchill; Orseille of the French, which yields the most valuable dye of all this tribe. Its several names are derived from a Florentine family of the Oricellarii, Riccellarii, or Riccellai, one of whom in the year 1300, carried on a considerable trade in the Levant, and returning with great wealth to Florence, first made known in Europe, the art of dyeing with this plant. Far more abundantly than with

us, it is the product of warm climates on maritime rocks in almost every part of the world, and always growing with *R. fuciformis*, DeCand, which might almost lead to the suspicion, that they were mere varieties of each other. The Canary Islands formerly yielded this Lichen in abundance, whence it has been called Canary weed; but so great has been its consumption of late years, that the best quality of it, whose average price is £200 per ton, (about 1-12 per seer, or Rs. 70 per maund,) has become extremely scarce, and what is commonly imported from other countries, is not worth £30 the ton, or Rs. 10 per maund, (a trifle more than three pence a pound, or 4 As. per seer.) The English blue broad cloths are first dyed with Archill, which gives their peculiar lustre and purple tint when viewed in a certain light.—*English Flora*, vol. v. p. 221.

M. Robiquet has separated the colouring matter of this vegetable. The new and singular product which he has obtained has a very sweet flavour, is easily soluble in water, colourless, crystalizes in beautiful flat quadrangular prisms; by means of a moderate heat it may be volatilized without decomposing, and does not acquire the colouring property till it has undergone successively the action of ammonia and of common air.—*Silliman's Journal*, vol. 18, in *English Flora*, vol. v. add. and corrig. p. 10.

Note.—*Roccella fuciformis*, DeCand, is said by Dr. Royle, (*Illustr.* vol. i. p. 438,) to be more widely diffused than *R. tinctoria*, being found in Europe, Brazil, as well as in Ceylon and the Peninsula of India, whence several specimens have been sent to the Royal Asiatic Society; but it is far inferior in quality, containing indeed hardly any colouring matter.

Dr. Ure in his Dictionary of Arts and Manufactures, details under the article *Archil*, the different modes by which it may be rendered useful, and the reader who wishes to be acquainted with them cannot do better than consult the Dictionary. I may observe, that the *Chulchulera* of Hindoostan belongs to the Genera BORRION or *Evernia*, which are both in the same group with *ROCCELLA*, (the *Umbilicariææ*), and closely allied to it in exterior characters.

Evernia Prunastia, Ach.

Was brought into use in Glasgow by the late Lord Dundonald, and employed (during the war) instead of gum in calico-printing, it afterwards fell into disuse as a very inferior substitute for that article.—*English Flora*, vol. v. p. 224.

The next useful species noticed by Hooker is *Ramalina Fraxina*, Ach. which has been used in Glasgow for the same purpose as the *Evernia Prunastia*, (*Flora*, vol. v. p. 225); and from the apparent number of species of this Genus in the Himalayas, it might be turned to advantage.

In the next family the *Usneæ* are the *Usnea florida* and *U. barbata*, both abounding not only in the Himalayas, but in all parts of India, and in Ceylon, as well as in South America; where, according to Humboldt, the *Usnea barbata* is employed as a substitute for the *Roccella tinctoria*.

In the succeeding family, the *Corniculariæ*, we have the *Alectoria jubata*, Ach., or *Rockhair*, (which is found in the Himalayas as well as in Europe,) and is said by Linnæus to supply the rein-deer with food in winter when the snow is very deep upon the ground; for this purpose the Laplander cut down the trees, that the plant upon the topmost branches may be accessible to this useful animal.—*English Flora*, vol. v. p. 227.

The last useful species mentioned in Hooker, is the

Cladonia Rangiferina, Hoffm.

This for the greater part of the year, and especially in winter, is the support of vast herds of rein-deer, wherein consists all the wealth of the Laplanders. No vegetable, Linnæus tells us, grows throughout Lapland in such abundance as this, especially in woods of scattered pines, where for very many miles together, the surface of the sterile soil is covered with it as with snow. On the destruction of forests by fire, when no other plant will find nutriment, this Lichen springs up and flourishes, and after a few years, acquires its full size. Here the rein-deer are pastured, and whatever may be the depth of snow during the long winters of that climate, these creatures have the power of penetrating it and obtaining their necessary food. Linnæus has given a beautiful description of this Lichen, and of these animals whose support it is, in the *Flora Lapp.* p. 332, but it is too long for insertion in this place.—*English Flora*, vol. v. p. 235.

It appears (*Ure's Dictionary of Arts*, p. 53,) that the latest researches on the Lichens as objects of manufacture, are those of Westring of Stockholm. He examined 150 species, among which he found several which might be rendered useful. He recommends that the colouring matter should be extracted in the places where they grow, which would save a vast expence in curing, packing, carriage, and waste. He styles the colouring substance itself cutbear, persio or turnsole; and distributes the Lichens as follows: [Ure applies to all the generic name of *Lichen*. I have endeavoured to supply the new nomenclature from Hooker.* H. C.] 1st, Those which left to themselves exposed to moderate heat and moisture, may be fixed without a mordant upon silk or wool, such are the *L. cinerea*, (*Urceolaria cinera*, Ach.); *L. hematonta*; *L. ventosus*, (*Lecanora ventosa*, Ach.); *L. corallinus*, (*Isidium corallinum*, Ach.); *L. Westringii*, (*Isidium Westringii*, Ach.); *L.*

* And have marked those with a (*) which are indigenous to, or have congeners, in the Himalyas.

saxatilis, (*Parmelia saxatilis*, Ach.); *L. conspassus*; *L. barbatus*, (*Usnea barbata*, Ach.); *L. plicatus*, (*Usnea plicata*, Ach.); *L. vulpinus*, Hud., (*Borreria flavicans*, Ach.); &c.

2. Those which develop a colouring matter fixable likewise without mordant, but which require boiling and a complicated preparation, such are *L. subcarneus*; *L. farinaceus*, (*Ramalina farinacea*, Ach.); *L. jubatus*, Linn. (*Olectoria jubata*, Ach.); *L. furfuracens*, (*Borreria furfuracea*, Ach.); *L. pulmonarius*, (*Sticta pulmonaria*, Hook.); *L. cornigatus*; *L. cocciferus*, (*Scyphophorus cocciferus*, Hook.); *L. digitatus*, (*Scyphophorus digitatus*, Hook.); *L. uncialis*, (*Cladonia uncialis*, Hook.); *L. aduncus*, &c. Saltpetre or sea salt are requisite to improve the lustre and fastness of the dye, given by this group to silk.

3. Those which require a peculiar process to develop their colour; such as those which become purple through the agency of stale urine or ammonia. Westring recommends the following mode of testing: he put three or four drachms of the dried and powdered Lichen into a flask, moistened it with three or four measures of cold spring water; put the stuff to be dyed into the mixture, and left the flask in a cool place. Sometimes he added a little salt, saltpetre, quick-lime, or sulphate of copper. If no colour appeared he then moistened the Lichen with water, containing one-twentieth of sal ammoniac, and one-tenth of quick-lime, and set the mixture aside in a cool place from eight to fourteen days. There appeared in most cases, a reddish or violet coloured tint. Thus the *L. cinereus*, (*Urceolaria cinerea*, Ach.) dyed silk a deep carmelite, and wool a light carmelite; the *L. physodes*, (*Parmelia physodes*, Ach.) gave a yellowish gray; the *L. pustulatus* (*Umbilicaria pustulata*, Schrad.) a rose red; *L. sanguinarius*, (*Lecidea sanguinarius*, Ach.) gray; *L. tartareus*, (*Lecanora tartarea*, Ach.) a crimson red, &c.

I cannot conclude these extracts without giving an account from Ure of the *Orcine*, the name of the colouring principle of the *Lichen dealbatus*, Ach. (*Isidium paradoxum* of the same author,) styled by Messrs. Turner and Boner, a most beautiful production. The Lichen dried and pulverized is to be exhausted by boiling alcohol. The solution filtered hot, lets fall in the cooling crystalline flocks, which do not belong to the colouring matter. The supernatant alcohol is to be distilled off, the residuum is to be evaporated to the consistence of an extract, and triturated with water till this liquid will dissolve no more. The aqueous solution reduced to the consistence of syrup, and left to itself in a cool place, lets fall at the end of a few days, long brown brittle needles, which are to be freed by pressure from the mother-water and dried. That water being treated with animal charcoal, filtered and evaporated, will yield a second crop of crystals.

These are *Orcine*. Its taste is sweet and nauseous, it melts readily in a retort into a transparent liquid, and distils without undergoing any changes. It is soluble in water and alcohol. Nitric acid colours it blood-red; which colour afterwards disappears. Subacetate of lead precipitates it completely. Its conversion into the *Archil* red is effected by the action of an alkali, in contact with the air.

When dissolved for example in ammonia and exposed to the atmosphere, it takes a dingy brown-red hue; but when the *Orcine* is exposed to air charged with vapours of ammonia, it assumes by degrees a fine violet colour. To obtain this result, the *Orcine* in powder should be placed in a capsule, alongside of a saucer containing water of ammonia, and both should be covered a large bell-glass; whenever the *Orcine* has acquired a dark brown cast, it must be withdrawn from under the bell, and the excess of ammonia be allowed to volatilize. As soon as the smell of ammonia is gone, the *Orcine* is to be dissolved in water; and then a few drops of ammonia being poured into the brownish liquid, it assumes a magnificent reddish violet colour. Acetic acid precipitates the red lake of Lichen.

If the above pages contain a single hint which have escaped the researches of your able Curator, or others interested in his researches, I shall be amply repaid for the small trouble of transcribing them, and have the honor to remain,

Sir,

Your obedient servant,

Dehlee, 5th October, 1841.

HENRY COPE.

A Fourth Memoir on the LAW OF STORMS IN INDIA, being remarks and documents relative to the loss of the Ship GOLCONDA, in the Tyfoons of 22nd to 24th September 1840, in the China Sea. By HENRY PIDDINGTON, ESQ.

This memoir has arisen out of a question proposed to me by Mr. Greenlaw, the active Secretary to the Marine Board, which was in substance this: "*On what day do you think the Golconda was lost.*"? I found that the investigation which I undertook in order to reply to it with greatest possible precision, elicited facts of so much importance that they might be worth publication as a separate memoir; not only as records distinctly shewing the truth of the Law of Storms for the China Seas, but as affording to seamen a valuable practical lesson; for

as will be seen, we have here, of three, two ships which ran into the storms, of which one foundered, and the other was in great danger : while the third by heaving to, in due time and place, escaped all damage !

The *Golconda*, as my Indian readers well know, was sent from Madras, with the head quarters and a detachment of the 37th Madras Native Infantry on board, to reinforce the expedition in China. Together with her crew, there must have been nearly 400 souls embarked in her : she was seen on the 10th September standing out of the Straits of Singapore, by the *Calcutta Thetis*, as noted in Captain Roche's reply to my queries, and again in Lat. $13^{\circ} 44'$ N. Long. $112^{\circ} 58'$ E. by the *Thomas King*, as Captain Roche also states, since which time she has never been heard of. It is supposed she must have perished in the Tyfoon of the 22nd to 24th September, in which the *London Thetis* and the *Calcutta Thetis* both suffered greatly ; the latter being dismasted.

It may perhaps be necessary to remark here, to those who are not professionally acquainted with the navigation of the China seas, that there are two routes from Singapore to Canton during the S. W. monsoon, the one being along the coast of Cochin China, and the other, the usual track, between the Macclesfield Bank and the Paracels. We are certain, from the *Golconda's* having been seen on the 18th September, that she took the usual route, which was also that pursued by the *London* and *Calcutta Thetis* ; and as I shall shew, there seems to be the utmost probability that she ran into, or was overtaken by the centre of one of the hurricanes which those ships met with, in which she foundered. She was, I believe, an old ship ; but her commander was a gentleman of much nautical knowledge and experience, though it is possible that, like so many more, he was not fully aware of the advantages derivable from due attention to this valuable class of knowledge.

As we have obtained the Log of the *Calcutta*, and a detailed report from the *London Thetis*, I have first given these. I have then followed them by a comparative table of the winds and weather at noon and midnight of each day ; and finally by a summary, shewing how the evidence goes to prove distinctly enough, that there were *two* storms travelling, the one to the WNW. and the other to the NNW. as will be seen by a careful comparison of the table, and the outline chart.

This is an additional reason, when ships are in the proper quarter of the storm circle, for heaving to, rather than scudding.

Report of the Ship Thetis of London reduced to Civil time.

In compliance with your letter received this morning, I forward you the particulars of a gale of wind encountered in the China Sea in September, 1840.

19th September.—Light Southerly winds, with hot sultry weather

{	Thermometer,	86½°
{	Barometer,..... ..	29. 94
{	Lat. by Observation, ..	14° 94' N.
{	Long. Chron.	113° 39' E.
	Calm during the night.	

20th September.—South Easterly airs towards morning, noon calm and sultry.

{	Thermometer,... ..	87°
{	Barometer,	29. 90
{	Lat. observation,	14° 53' N.
{	Long. Chron... ..	114° 9' E.

P. M.—Light NW. winds, with gloomy sky and close weather, midnight close weather.

21st September.—Noon rain and thunder, with squally weather, wind NW.

{	Lat. Observation,	15° 57' N.
{	Longitude, Chron.... ..	115° 9' E.
{	Thermometer,.. ..	84°
{	Barometer,	29. 87

Sympiesometer very unsteady from 29. to 29.30 during these 24 hours.

P. M.—Wind at NW. with squalls and lightning in the NW.

8. P. M.—Finer weather, midnight squally. Barometer falling gradually, wind very unsteady between W. and NW. large drops of rain.

22nd September.—Daylight strong breeze at WNW., heavy sea from NE., sent down the top gallant yards and masts, and otherwise made snug; the sky very wild and threatening. Noon, glass still falling; sea rising higher from the northward, and the wind increasing at NNW. Furl'd the top-sails and lay to under try-sails.

{	Thermometer,	85½°
{	Barometer,.....	29. 64
{	Sympiesometer,.....	29. 12
{	Lat. indiff't. Obsn.	16° 20' N.
{	Longitude,... ..	115° 30' E.

P. M.—Wind increasing at NW. till midnight, and gradually veering to WNW., blowing a violent gale with terrific squalls: Barometer still falling.

23rd September—A. M. Wind veered to West, blowing almost a hurricane. At 4 veered to WSW. still unabated, and at daylight veered to SW., force of the gale still unabated and continued so till noon; lightning all round, squalls very violent, but some appearance of amendment in the weather.

No observations. Position from observations next day.

{	Sympiesometer at noon,	28. 70
{	Barometer,... ..	29. 20
{	Lat. Observation,	16° 40' N.
{	Longitude,... ..	116° 15' E.

P. M.—Gale moderating fast, veering to South; 5 P. M. made sail, and ran before it, sea rising *more than in the height of the gale*. Midnight, Barometer 29. 50.

24th September—A. M. Moderating, and veering to Eastward of South. Squalls with rain. Noon moderate winds SSE.

{	Lat. Observation,... ..	18° 25' N.
{	Longitude,... ..	117° 20' E.
{	Thermometer,... ..	81½°
{	Barometer,	29. 80

From this time till the 26th, on which day we arrived at Macao, the wind continued S. Easterly and moderate, and the sea very confused. I there heard that vessels which arrived the day before us experienced a gale, commencing at North and veering to *East*, instead of to the West, as I experienced it, and those who arrived a day or so after us, had experienced a strong, steady SW. gale upon the 22d and 23d.

I also beg further to state, that the *Golconda*, now missing, sailed 24 hours before us from Singapore, also bound to Macao; and the *Thetis* of *Calcutta*, which ship arrived sometime after *dismasted*, I believe left Singapore a few hours after us. Another vessel in com-

pany with us just before the gale arrived like ourselves without damage, all which circumstances would lead to the inference, that the gale was partial in its violence, as well as different in its direction. I shall be happy to communicate any further particulars, if I have omitted any thing you might wish to know.

The following Statement is abridged from the Log Book of the CALCUTTA THETIS, and the reply of Captain Roche, commanding her, to some queries addressed by me to him. The dates relate to civil time.

The *Calcutta Thetis* left Singapore on the 13th September at day light; she had light Southerly and SW. 3 and 4 knot (rarely 5 knot) breezes to the 20th; having passed Pulo Sapata at 9½ A. M. on the 18th, on which day at noon her Lat. was 10° 10' N. Long. 109° 24' E.; on the 19th she was in Lat. 11° 44' N. Long. 111° 16' E. Bar. 29.79 Ther. 92°. Current for the past 24 hours, NE. by E. 71 miles, having had 60 miles to the NE. the two preceding days.

20th September.—She was steering NE. with SW. and WSW. airs and fine weather. At noon. Lat. 12° 40' N. Long. Chr. 111° 56' 45" E. Bar. 29.79. Ther. 89°. Current NE. ¾ E. 18 miles. At Midnight squally weather.

21st September.—Fine and smooth water; light airs from WNW. till 7 A. M. At noon Lat. 15° 20, N. Long. Chr. 112° 40' E. Bar. 29.70. Ther. 89°. A light drain of current to the NE.; 7 P. M. breeze freshening from NNW. with squalls. Course NE. going 6.4 knots. At midnight thick cloudy hazy weather.

22nd September.—Running to the NE. as before, with wind at NNW. to 4 A.M. when it was NW. Day-light thick unsettled weather, with a head sea; going 5 knots to NE. with wind WNW. Noon Lat. 14° 55' N. Long. Chr. 114° 17' E. Bar. 29.56. Ther. 86°. Current NE. ½ N. 16 miles. Wind W by S.—P. M. strong breezes WSW. and SW. At 5 P. M. every appearance of bad weather; sea rising from NE. made all preparations. At 9° 30' heavy squalls, wind being at SW. from 6. P. M.; split the foresail. Midnight, ship under mizen trysail and fore topmast staysail, incessant and increasing squalls, and sea getting up from the SW.; heavy rain.

23rd September.—A. M. Blowing a typhoon from SW. gusts tremendous, and in rapid succession. Bar. fell from 29.40 to 28.80 in

the two hours preceding midnight. Impossible to keep before the wind; broached to twice. At 3 h. 30' A.M. blowing a perfect tyfoon from SW.; hove to under the mizen try-sail. Day-light, tyfoon blowing most furiously, with a high turbulent sea, but vessel making good weather. 7 A.M. Gusts more furious, mizen try-sail blown away, and sails blowing from the yards, though secured by lashings. Wind SW. throughout. Ship lying to with head from NW. to N by W. During the morning lost mizen topmast and fore and main top gallant masts. Noon hurricane as before, sea high and cross; wind veering to the Southward. Lat. account $15^{\circ} 50'$. Longitude account $115^{\circ} 13'$ E. Bar. falling gradually from noon of the 22nd to 10 P.M. of the same date, when it was at 29.40, and at midnight fell to 28.80 as before mentioned. Midnight the same, but squalls not so frequent or so heavy; sea very cross; wind SW.

24th September.—A.M. Wind marked SSW. Heavy tyfoon and high cross sea. Vessel labouring much. At 2 A.M. the Bar. at 28.70, the lowest depression. About this time the heaviest of the storm. Towards 4 P.M. Bar. rose gradually. Wind South at 5 A.M. Daylight moderating, but the wind falling fast, caused the ship to roll so much, that by noon she had rolled away her main-mast, and suffered much damage. Noon, Lat. $17^{\circ} 14'$ N. Long. account $115^{\circ} 11' 35''$ E. Bar. 29.40. Gale breaking and wind South. At 8 P.M. SSE. with hazy weather. The foremast was saved with much difficulty by cutting away the topmast and fore yard. At one time the vessel, by the pumps being stove by the fall of the mast, had three feet water in her hold. Midnight moderate and hazy.

25th September.—Noon, Lat. $18^{\circ} 25'$ N. Longitude $115^{\circ} 57'$ E.

Captain Roche remarks, that, "at the commencement we had a good deal of lightning, with not much thunder or rain, and indeed through the height of the storm scarcely any, till about between 2 and 4 A.M. of the 24th, after which the gale was on the decline. The Longitudes are from the means of three watches, which were found correct on making the land."

I annex a tabular Statement, shewing the relative position of the two ships, as marked on the Chart annexed to the Memoir.

Tabular view of the Hurricane of 22nd to 24th September 1840, in the China Sea, as experienced by the ships THETIS OF LONDON and THETIS OF CALCUTTA.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
19th Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Light Southerly, hot and sultry weather, Light SW. airs and fine,	0 / 14 20 11 44	0 / 113 39 111 15	29.94 29.79	0 0	80 $\frac{1}{2}$ 92 $^{\circ}$	
20th Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Calms and Light SE. airs, sultry, SW. and WSW. airs and fine,	14 53 12 40	114 9 111 57	29.90 29.79	0 0	87 89	At Midnight squally weather.
21st Sept. at Noon.	{ London Thetis, } Calcutta Thetis,	Light NW. winds, gloo- my and close, Light from WNW till 7 P.M. at 7 breeze freshen- ing from NNW. thick cloudy weather,	15 57 13 20	115 9 112 40	29.87 29.70	29.30 0	84 89	Noon rain, thunder, and squally; wind NW. Simp. very unsteady during this { 24 hours.

Date.	Ships' Names.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Simp.	Ther.	Remarks.
22nd Sept. at Noon.	{ London Thetis, Calcutta Thetis, }	NNW. Increasing breeze { and sea, } W by S. strong breezes, ...	0 ' 16 20	0 ' 115 30	29.64	29.12	85½	{ Threatening ; sea rising ; glass falling, and wind increasing ; hove to. { Increasing with gloomy wea- ther ; running to the N.E.
22nd Sept. at Midnight.	{ London Thetis, Calcutta Thetis, }	WNW. violent gale, { terrific squalls, } SW. Increasing and incessant squalls ; running to the N.E. and NW. since noon,	0 14 55	0 114 55	29.56	0	0	Bar. still falling. Sea getting up from SW.
23rd Sept. at Noon.*	{ London Thetis, Calcutta Thetis, }	SW. almost a hurricane, ... SW. furious typhoon, ly- ing to,	16 40 15 50	116 15 115 13	29.20 28.80	28.73 0		No abatement. High sea ; lost mizen topmast.
23rd Sept. at Midnight.	{ London Thetis, Calcutta Thetis, }	About South, moder- ating fast, SW. Heavy typhoon, { squalls not so frequent, .. }	0 0	0 0	29.50	0	0	{ Bore up at 5 p.m. Sea high- er than in the gale. Sea very cross.
24th Sept. at Noon.	{ London Thetis, Calcutta Thetis, }	SSE. Moderate, S. Gale breaking, ...	18 25 17 14	117 20 115 35	29.80 29.40	0	0	{ Fine and squalls, wind SE. and moderate to Macao. A.M. Rolled away the main mast, &c.; at 8 p.m. wind SSE.

* Golconda probably lost about this time.

We have now to examine the construction of the Chart, and the evidence there is for the two storms as there laid down.

Taking first the *London Thetis*, as the vessel which was farthest to the northward, we find her on the 21st September with the wind at NW. with ugly weather, and the *Simpiesometer* warning her by its oscillations, of bad weather for the whole previous 24 hours; being moreover 0.50 to 0.80 below the Barometer!* The *Calcutta Thetis* had thick cloudy weather, with a smart breeze at NNW.; her Barometer sinking to 29. 70

At noon on the 22nd, the *London Thetis*, with the sea rising from the NE. and Northward, the wind increasing from NNW. the weather threatening, and the glasses still warning, very properly hove to under trysails. We may take the storm to have fairly begun with her now, and I have thus laid down its centre as bearing from her about 130 miles to the ENE., which, assuming it to be a circular storm, would give it a diameter of 260 miles.

The *Calcutta Thetis* at the same time has the wind a strong breeze at W. by S. to which point her NNW. breeze had gradually veered; her Barometer had fallen to 29.56, with threatening weather and a head sea, the ship always running to the NE. from 6 to 5 knots an hour. If we look at the circle of the *London Thetis* storm, we see that this could not be the same; for if we extended it to here, it would give us the wind at about NW. by W. instead of W. by S. while it is to be particularly noted, that the changes of wind which the *Calcutta Thetis* has from 7 P. M. of 21st to 4 A. M. and noon of the 22nd, are exactly such as should occur from a ship, and a circular storm running on the tracks which I have laid down: the ship in fact *chasing* the storm! Thus it will be seen that at 4 A. M. when it was NW. the first circle on the track of this storm makes it so, and this track must be the right one, because the wind being W by S. at noon, clearly shews, that the ship had passed to the Eastward of the meridian of the centre at that time, i. e. the centre was bearing N by W. from her if it was a circle. I do not fail to observe, that by this track she is placed within a much shorter distance of the centre at this time than afterwards on the 22nd at midnight, and during the 23rd, when the greatest fall

* A very beautiful instance of the importance of this invaluable instrument.

of the Barometer was experienced, and the storm was raging in its greatest fury ; but it does not appear to me, that the winds from noon of the 22nd, the time it was at W by S. to the following midnight, and to noon of the 23rd, when it was a steady SW. typhoon, allow us to assign any other track. We may either suppose that the storm was only forming on the 21st, or that the track curved away to the Eastward to account for this possible anomaly in the distance from the centres. It is certain a storm must begin somewhere, and I presume it here to have done so on the same line as that on which we find we can track it as a completely developed hurricane.

Again ; if we attempt also to extend the circles of this storm at this time, noon 22nd, to the *London Thetis*, we shall find that it would give a SSE. wind, instead of a steady NNW. one, with every appearance of a storm and this storm really setting in a few hours after, with exactly the changes of wind which should, by the theory, occur. I may perhaps be thought prolix in this explanation of my reasons for laying them down as two separate storms ; but I have thought it very essential to our object, which is both to register the facts, and to draw useful conclusions from them, to shew carefully upon what grounds any thing is supposed to be proved which we assume or lay down.

At midnight 22nd-23rd, we find that the *London Thetis* has a violent gale WNW. with terrific squalls and Barometer still falling. The WNW. wind would place the centre bearing NNE. from her, and allowing for her drift from noon, when she so prudently hove to, the centre at this time may be about where we have placed it. The *Calcutta Thetis* has the wind at this time at SW. a tremendous gale also, which of course makes the centre of her storm bearing NW. from her as I have placed it, and it will be observed that the same discrepancy would exist, as before if we attempt to extend the circle of the one ship's storm to the place of the other ; shewing I think to demonstration, (for the places of both ships are perfectly well ascertained,) that there must then have been the two storms which I have laid down.

There is a very remarkable fall of the *Calcutta Thetis*' Barometer ; viz. 29.40 to 28.80, or more than half an inch in the two hours preceding this epoch (midnight of 23rd) and we find that at 2 A. M. on the 21st

it had reached its maximum depression of 28.70. Now we have not, unfortunately, the *London Thetis'* Barometer for this moment, but we *may* suppose this fall to have arisen from the near appulse of the two tempests? There *may* have been a point, midway between them at which the barometrical depression arising from both storms may have operated, though the winds were directly opposed. What this produced we know not. It might have been a calm, but it was quite as probably, a succession of awful gusts from every quarter of the compass mixed with calms, (almost as dangerous in such weather,) much resembling the sort of weather which every seaman has seen near the line, on the coasts of Africa, or on those of Borneo, in violent thunder storms of long duration; but of course far more violent, and with a most dangerous sea. At noon of the 23rd, the *London Thetis'* storm having travelled onwards, as by the track, and the vessel having drifted the other way, she has the wind at SW. and "some appearance of amendment," though the Simplesometer and Barometer are still at the lowest registered depression. By 5 P. M. she could bear up, the storm, having veered to South, and what is worthy of remark, we find that as she approaches and crosses the track we have laid down for that of the centre of the storm, she has then the "sea rising *more* than in the height of the gale,"! which is some evidence that we are not far wrong.

The *Calcutta Thetis*, which was now, providentially, lying to, had the weather at noon of the 23rd terrific; but towards midnight she has fewer squalls, the wind veering to SSW. after that time, and to South by daylight on the 24th. At noon, it fell so fast, that she rolled away her mainmast, and was nearly foundering by her pumps being destroyed by the fall of the mast.*

She did not cross the previous track of her own storm after she bore up, but that of the *London Thetis'* storm is close to her position at noon; and though the sea had had 24 hours to go down since the centre passed, the latter portion of it, and that part of the sea of the *Calcutta Thetis'* storm which reaches this point, may well have assisted to produce this dangerous sea.

I have thus shewn, I hope distinctly, and almost to a mathematical certainty, that there were two storms. From the logs of single ships,

* This is worthy the attention of seamen and owners. The pumps, especially in small vessels, seem placed to insure the most frequent occurrence possible, of this fatal accident; and no doubt vessels have been frequently lost through it.

the tracks are not easily laid down very correctly, so that allowance must be made for this imperfection. To say *where* the unfortunate *Golconda* perished is of course impossible, for like the *Calcutta Thetis*, which was in great danger, she may have foundered after the storm. The probability, however, is, that she was tempted by the Westerly breeze to run on, as the *Calcutta Thetis* was, and was thus lost by running into the centre of the tyfoon. There have been, even with our limited knowledge and field of research, so many instances of this kind, (See Third Memoir in Journal Asiatic Society, vol. ix, p. 1053) that we are not judging harshly, I think, if we suppose this awful loss to have arisen from another of them. The lesson afforded by this investigation is one which the dullest may read. Of three ships exposed to storms of the same kind, the commander of one, taking due warning, and probably well acquainted with the Theory of Storms, heaves to and makes all snug, which is what ought to have been done; for he was in the South-Western quadrant of a storm travelling across and ahead of him. The second, with less warning it is true, having apparently no Simpiesometer on board, and tempted by the fair wind, runs on and narrowly escapes foundering; for as will be seen, he runs along the South-Eastern edge of his storm; and the third we may easily suppose to have perished through an error of the same kind leading him farther and into the dangerous centre.

I ought not to omit remarking here, the exact confirmation of the theory, which we find in the report of the *London Thetis*, when Captain Cass mentions that the ships ahead of him had gales at North veering to Eastward. This is exactly what should occur, and proves to a certainty, that this tyfoon was a rotatory storm. I should mention also, that the storm-circles on the chart are not struck with any reference to the sizes of the vortices, of which we know nothing, but simply to shew the winds at noon and midnight; and from centres upon the supposed tracks of the tyfoons as far as these can be ascertained by careful projection.

Classified Catalogue of Mammals of Nepal, (corrected to end of 1841, first printed in 1832.) By B. H. HODGSON, Bengal Civil Service.

BIMANA.

O. Homo Sapiens.—Mass of population belongs to Kalmuc subdivision of the Great Mongolian stirps, with some admixture of Indian stock. In the *Tarai* and low valleys of the hills, are some traces of aborigines of Southern race, like the Bheels, Coles, &c. These latter are denominated Thárt, Denwár, Durre, Manjhi, and Brahmoo.

N.B.—As to location, the following initial letters signify as follows:—H. is habitat, and G. after it is general, that is, both *Tarai* and all three regions of the hills. L. is lower hilly region. C. is central hilly region, and N. is northern hilly region. T. is *Tarai* and saul forest, or the plains at the base of the mountains. For a general sketch of features and character of the above four regions, see Catalogue as first printed *apud* Journal. Asiatic Society.

QUADRUNANA.

SIMIADÆ.

1. *Semnopithecus necnon Cercopithecus.*—Gen. ch. nobis. Facial angle 45 to 50: face flat: nose short with long narrow lateral nares: limbs long: thumbs small remote: no cheek pouches: 5th tubercle on last molar present or absent: callosities large: canines variable, large only in grown males: stomach sacculated and banded as well as intestines: tail very long, commonly tufted, and exceeding the length of the animal. Agile, grave, gregarious, not docile.

1. Sp. new. schistaceus nob. (*Nipalensis* of former catalogue, see remark at end.)

H. T. and L. more rarely C. and N. even.

2-3. *Macacus? Pithex*, Nob.—Gen. ch. nob. Facial angle 50: muzzle not elongated. Callosities and cheek pouches large. Buttocks often nude. Structure compacter, but generally like that of *Semnopithecus*; limbs shorter, thumbs larger, orbits more salient, head rounder, canines similarly variable, nares shorter,

rounder, and more terminal stomach simple. Cæcum and rectum sacculated. Tail equal to half the length of the animal. Agile, lively, gregarious, familiar and docile.

2. Sp. new. *Oinops et Pelops*, nob.

H. of the first, T. L. and C.—of the second, N.

VESPERTILIONIDÆ.

RHINOLPHINÆ.

- 4-5. *Rhinolphus*.—2 Sp. new. *Armiger et Tragatus*, Nob. H. C. so far as known.

PTEROPINÆ.

- 6-7. *Pteropus*.—2 Sp. new. *Leucocephalus et Pirivarus*, Nob. The first is alleged to be identical with *Medius Auct* ; H. T. passerger in hills.

VESPERTILIONINÆ.

- 8-12. *Vespertilio*.—5 Sp. new. *Formosa, Fuliginosa, Subbadia, Muricola et Labiata* Nob. H. C. so far as known.

FERÆ VEL CARNIVORA.

FELIDÆ, genus—FELIS, subgenera.

- 13-19. *Felis*.—7. Sp. *Tigris, Pardus, Leopardus, Macrocelis, Nepalensis Auct. Vivérriceps et Murmensis*, Nob. *Viverriceps* is identical with *Viverrinus Auct.* Of 1, 2, 3. H. G. ; of 4, 5, 7. C. ; of 6. T. but Leopards are nearly confined to the hills.
20. *Lynx*.—1. Sp. new. *Erythrotus*, Nob. apparently identical with *F. Chaus Auct.* H. G.

CANIDÆ, genus—CANIS, subgenera.

21. *Canis*.—1. Sp. domestic, two varieties of the Mastiff and two of the Terrier of Tibet ; the Pariah of the plains, and cross-breeds with the first ; of 4 first H. N. ; of rest, G.
- 22-23. *Vulpes*.—2. Sp. *Indicus, Nob. et Montanus, Pearson.* *Indicus* is apparently identical with *Bengalensis*, *Necnon Kookri*, H. of first T ; of second, C. and N.
24. *Sacalins*, Smith, *Oxygoils*, Nob.—Jackall, 1. Sp. *Indicus*, Nob. var. of *Aureus* ? H. G.

25. *Cuon* Nob.—General structure and dentition of *Canis*, but molars $\frac{6}{6}$ $\frac{6}{6}$ only, the 2d tubercular being deficient. Odour and aspect of the last. Head blunter. Tail and ears larger. Teats 12 to 14. Venatory, gregarious, does not burrow.
1. *Sp. Cuon Primævus* Nob. type.—*Canis Primævus* of Bengal. Asiatic Society's Transactions, (subsequently named the type-*Chrysæus* by Smith.) H. L. C. and N.

MUSTELIDÆ.

VIVERRINÆ.

- 26-27. *Herpestes*.—2 Sp. new. *Griscus*, Auct. et *Auropunctatus* Nob. The latter is alleged to be identical with *Edwardsii* Auct. H. T. and C. respectively.
- 28-29. *Viverra* Auct.* Size large, robust habit, never climbs, thumb not remote, nails obtuse.
2. Sp. new. *Melanurus* et *Civettoides*, Nob. H. G.
- 303-1. *Viverricula*, Nob.—Size small, scansorial, habit vermiform, nails more or less raptorial, and thumb remote, pouch as in *Viverra*.
- 2.—*Sp. Indica* et *Rasse* Auct. H. T.
32. *Prionodon*.—1. Sp. new. *Pardicolor* Nobis, H. C. and N.
- 33-35. *Paradoxurus*.—3 Sp. new. *Hirsutus*, *Nepalensis*, et *Laniger*, H. T. C. N. respectively.
- N. B.—First possibly identical with *Bondar*.
36. *Ailurus*.—1 Sp. *Fulgens* Auct. the Wah, H. N.

MUSTELINÆ.

- 37-40. *Mustela*.—4 Sp. *M. Erminea* Auct and three new, *Hemachalanus* et *Calotis* et *Auriventer* vel *Cathia*, Nob. H. C.
41. *Martes*.—1. Sp. *Flavigula* Auct. H. C.
- 42-47. *Lutra*.—6 Sp. *Leptonyx* et *Nair* Auct. and four new. *Tarayensis* *Monticola*, *Indigitata*, *Aurobrunnea*, Nob. H. of 3 first is T.; of 3 next, L. and C.
48. *Gulo*.—1. Sp. new. *Nipalensis*, Nob. (alleged to be identical with *Helictis moschatus* of Gray, and also with *Gulo Orientalis* of Horsfield.) H. L.

* These are differential characters merely and are ours. See *Viverricula*.

49. *Mesobema (olim Urva) Nob.*—Teeth as in *Herpestes*, but blunter; structure and aspect precisely mediate between *Herpestes* and *Gulo*. On either side the anus a large hollow smooth-lined gland secreting an aqueous foetid humour, which the animal ejects posteaally with force. No subsidiary glands, nor any unctuous fragrant secretion. Teats 6, remote and ventral; orbits incomplete. Parietes of the scull tumid, with small cristæ.
1. Sp. *M. Cancrivora*, Nob. type: the *Gulo Urva* of Asiatic Journal, Nob. H. L. and C.

URSINÆ.

50. *Ursitaxus*, Nob.—Molars $\frac{4}{4}$. $\frac{4}{4}$. of ursine flatness almost on the crown, but the last above transverse, and less than the carnassial tooth. Aspect and size of *Taxus*. No ears, coarse scant hair, anal glands as in *Mydans*. Genital organ bony, and annulated spirally. Typically plantigrade and fossorial. Carnivorous. Teats 4 in a transverse parallelogram.
1. Sp. *Inauritus* Nob. Indian Badger of Pennant and Hardwicke type. H. L.
- N. B.—This form I still think is erroneously sought to be identified with *Ratelus Mellivorus*.
- 51-52. *Ursus*.—2. Sp. *Tibetanus* et *Isabellinus* Auct. H. of first is C. second N.
53. *Prochilus*.—1. Sp. *Labiatus* Auct. H. T.

SORECIDÆ.

- 54-56. *Erinaceus*.—3. Sp. *Spatangus Collaris*, et *Grayii* Auct. H. C.
- 57-58. *Sorex*.—2. Sp. *Indicus* Auct. et *Pygmæus* Nob. H. G:
59. *Talpa*.—1. Sp. new. *Micrurus* Nob.* H. C. and N.

* Specific. Character Uniform velvet black with silvery grey gloss iridescent when moist; nude snout; feet and tail, fleshy white; the last very minute; structure otherwise typical. Snout to rump $4\frac{1}{2}$ inches. Head $1\frac{1}{2}$. Tail $\frac{3}{16}$. Palma and nails $\frac{7}{16}$. Planta and nails $\frac{13}{16}$.

UNGULATA.

PACHYDERMES.

60. *Elephas*.—1. Sp. Indicus Auct. two varieties, *Isodactylus* et *Heterodactylus* Nob. H. T.
61. *Rhinoceros*.—1 Sp. Indicus Auct. H. T.

ANAPLOTHERES.

62. *Sus*.—1 Sp. S. Aper Auct. the wild Boar, two varieties, *Aipomus* et *Isonotus* Nob. H. G.

EDENTATES.

63. *Manis*.—1 Sp. new. *Auritus* Nob. alleged to be identical with the common Indian type or *Pentadactylus*. H. G.

RUMINANTES.

BOVINÆ.

Genus *Bos*. Subgenera?

64. *Bos*.—Cranium moderate, proportional, or without excess in the cerebral or facial region; frontals shorter than the face, flat, and not broader than long. Occipital plane of the skull quadrangular, never arched along the culmenal line, nor indented by the temporal fossæ, smaller much than the frontal plane and forming an acute angle therewith. Horns attached to the highest line of the forehead, rounded, moderate, curved up or down or forward; 13 pairs of ribs; no true dorsal ridge, but sometimes a fleshy hump; dewlap and muzzle large and square.
1 Sp. and type, *Bos Domest*: Nipalese varieties of. H. G.
N.B.—These Bovine characters are all ours. See *Journal Asiatic*.
65. *Bibos Nobis*.—Cranium large, massive, exhibiting preponderance of the frontal and cerebral portion over the facial; frontals as long as the face, concave, broader than long, and surmounted by a large salient crest ascending above the highest bases of the horns. Occipital plane of the skull spheroidal, very large, larger than the frontal plane, deeply indented in its centre by the temporal fossæ, and forming an acute angle with

the frontal plane. Horns attached below the highest line of the frontals, massive but short, ovoid or subtrigonal, and curving ascendantly; thirteen pairs of ribs; a true dorsal ridge co-extensive with the ribs and terminating abruptly; dewlap and muzzle small; period of gestation longer than in *Bos*.

1 Sp. and type. *Bibos Cavifrons*: probably the *Bos Gaurus* of authors. H. T.

N. B.—*Gavæus*, an aberrant species leading to *Bos*?

66. *Bison*.—Cranium moderate, depressed, inclining to Bubaline forms in the excess of the facial portion over the frontal, and in the rounding off of the frontals into the occiput; frontals decidedly broader than long, more or less convex, and forming an obtuse angle with the semi-circular or trigonal occipital plane which is strongly ridged by the parietes at its summit, is smaller than the frontal plane, and moderately indented. Horns attached rather in advance of the parietal apex of the cranium, small, rounded, curving ascendantly, or out of the horizontal; 14 (or 15) pairs of ribs; a true dorsal ridge, but confined to the withers, and terminating posteally in a gradual slope; dewlap none; muzzle small. Types *B. Americanus* et *Pœphagus*.

1. Sp. *Pœphagus* in Nepal. H. N. and also Tibet.

67. *Bubalus*.—Cranium large, elongate, compressed or narrow, disproportioned, exhibiting great excess (a 3rd) in the facial over the frontal or cerebral portion; frontals short, narrow, convex, usually forming an obtuse angle with the occipital plane, which is large and circular in proportion to the obtuseness of that angle, and to the consequent rounding off of the culmenal line of separation; parietals merged, not ridged as in the last, nor culmenal. Horns attached to the ends of the highest line of the skull, always exceeding in length that of the cranium, and usually greatly so, depressed, strictly trigonal, and neither ascending nor descending, but directed horizontally backwards; thirteen pairs of ribs; no true dorsal ridge nor fleshy haunch; muzzle large and square; dewlap medial.

1. Sp. and type, *Bubalus Arna*, fœm. *Arnee*, two varieties. *Macrocerus*, et *Speirocerus*, Nob. H. T.

ANTELOPIDÆ VEL. CAPRIDÆ.

- 68-69. *Antelopa*.—2 Sp. *Cervicapra* Auct. et *Pennettii* Auct ? *Bharatensis*, Nob. Vulgo, the Chouka or Ravine Deer. It seems to be identical with *Africana* Auct. H. T.
70. *Pantholops* Nob.—Molars $\frac{5}{5}$, incisors erect, strong and rectilinearly ranged. Horns with clear sinus in cores, long, slender, erect, sublyrate, inserted between the orbits, compressed, nodose, and approximated at their bases. Large inguinal purses. No suborbital sinus. Nose ovine, bluff and hairy. Large intermaxillary pouches or subsidiary nostrils. Knees simple. Ears pointed, short. Tail short, full. Hoofs low, broad and padded with large interdigital pores. Size, habits, and general aspect of *Antelopa* et *Gazella*. Females hornless, with lesser inguinal purses, and two teats.
1.—Sp. new, and type *Antelope Hodgsonii* of Abel; the Chiru of Tibet. H. N. *transnivem*.
71. *Tetracerus*.—1 Sp. *Chickara necnon Quadricornis* Auct. *Chousingha* of Hindoos. H. T.
- 72-73. *Nemorhædus vel Kemas*.—2 Sp. *Goral* (*Hardwickii*) et *Proclivus vel Thâr* Nob. H. C. and N.
74. *Capra, wild*.—1 Sp. *C. Ibex* Himalayan variety and tame, two varieties of the common Goat and two of the Shawl Goat, or Sinal; 1 2, Doogoo; 3, Chângra; 4, Chappoo. H of 1, is N.; of 2, 3, C.; of 4, 5, N. and Tibet.
75. *Hemitragus* Nob.—General structure, odour, and horns of *Capra*, but having a small moist muzzle and four teats in the females; no interdigital pores. H. N.
1.—Sp. and type, *Capra Quadrimammis vel Jharal* Nob. C. *Jemlaica* of H. Smith?
N.B.—Mr. Ogilby has unwisely confounded this type with his *Kemas*, the characters of which group were, by the by, first correctly stated by myself, as were those of *Hemitragus*. The *Goral* or type, or *Kemas* has, (besides a larger muzzle than that of *Jharal*,) interdigital pores; the *Jharal* or type of *Hemitragus* has none, wherefore Mr. Ogilby was especially bound by his own principles not to confound the two.
- 76-77. *Ovis, wild*.—2 Sp. new, *Ammonoides* Nob et *Nahur* Nob; and four tame varieties; viz. the *Hûnia*, *Bâr wâl*, *Câgo* and *Silingia*. H. of 1, 2, is N.; of 3, N.; of 4, 5, 6, C.

CERVIDÆ.

Genus CERVUS—Subgenera.

78. *Cervus*.—1 Sp. *Elaphus* of the Saul forest, possibly a distinct species, *Affinis* Nob. Bara Singha of Hindoos. H. T.
79. *Pseudo-cervus* Nob.—1 Sp. *Cervus Wallichii* Auct. type. Tail nearly obsolete. Horns branched at the base as in *Cervus*, above as in *Rusa*, and quadrifurcate, size smaller.
N.B.—Alleged to be identical with *Affinis*. H. N.
80. *Rucervus* Nob.—Aspect and size mediate between *Elaphus* and *Hippelaphus*. Muzzle remarkably pointed. Horns moderate, smooth, pale; one forward basal process on each beam; no median; summit branched as in *Elaphus*. Canines in males only.
N.B.—These subgeneric characters are ours, and are confessedly frailly based, but not less so than the admitted distinctions. The whole family requires reconstruction.
- 1—Sp. new, *Cervus Elaphoides* Nob. H. T. This is identical with the *C. Duvancellii* of Cuvier.
- 81-83. *Rusa*.—Canines in both sexes. Heavily maned. Horns with one basal and one superior process, thick, dark, and pearly.
- 3.—Sp. new, *Jaraya et Nepalensis et Heterocervus* Nob.
N. B. *Jaraya* probably identical with *Hippelaphus* et *Aristotelis*. H. T. and L. rarely.
- 84-86. *Axis*.—3. Sp. 1st *Cervus Axis* Auct. or *Axis Major* Nob. 2nd *Axis Minor*, Lesser spotted Deer Nobis, and 3rd *Axis Procinus*. Smith. H. T.
87. *Styllocerus*—Sp. new, *Ratwah*, Nob. The Kaker and Barking Deer of Europeans. Probably identical with the insular type or *Cervus Muntjac*. H. T. L. and C.

MOSCHIDÆ.

- 88-90. *Moschus*.—3. Sp. new. *Leucogaster*, *Chrysogaster*, et *Saturatus*, Nob.
N. B.—*Saturatus* is probably identical with the *Moschatus* of Linnæus. H. N. and Tibet.
91. *Tragulus*.—1 Sp. new, *Mimenoides* Nob. Vulgo Bijay. H. T.

SOLIPEDÆ.

92. *Equus*.—1 Sp. two small tame Himalayan and Trans-Himalayan varieties. H. N. and Tibet.

RODENTIA. MURIDÆ.

- 93-94. *Mus*, *Rats*.—6 Sp. *Rattus* Auct. ? *Rattoides* Nob. *Decumanus* Auct. *Decumanoides* Nob. *Nemorivagus*, et *Nitidus*, et *Hydrophilus*, et *Niviventer* Nob. H. C. and N. so far as known.
- 99-102. *Musculus* Nob. *Mice*.—4 Sp. new, *Cervicolor*, *Dumecolus*, *Nipalensis*, et *Dubius* Nob. H. C. and N. so far as known.
- 103-104. *Arvicola* ? *Neotoma*.—2 Sp. new, *Pyctoris* et *Myothrix* Nob. also probably the *Hydrophilus* introduced above. H. C. and N.
105. *Arctomys*.—1 Sp. new. *Himalayanus* Nob. H. N. and Tibet.
106. *Rhizomys*.—1 Sp. new, *Badius* Nob. H. L. and C.

SCIURIDÆ.

- 107-109. *Sciurus*.—3 Sp. new, *Macruroides*, *Locria* et *Locroides* Nob. H. L. C. and N. indifferently.
- 110-112. *Sciuropterus*.—3 Sp. new, *Magnificus* et *Chrysotrix*, et *Alboniger*. H, L. C. and N. rarely L.
113. *Hystrix*.—1 Sp. new, *Nipalensis* Nob. *Leucurus*. H. G.
- 114-115. *Lepus*.—2 Sp. new, *Macrotus* et *Oiostolus* Nob. H. of 1st, G. ; or 2nd N. and Tibet.
- N. B.—These are the *Indicus* et *Omodius* of former catalogue ; but several local names are now dropt.
116. *Lagomys*.—1 Sp. *Nipalensis* Nob. H. N. and Tibet.

In all 116 species, of which probably 55 to 60 are new. Their descriptions, with four or five exceptions only, are to be found in the Journal of Bengal Asiatic Society, and in that of Mr. McClelland. The remaining four or five yet unpublished are forthcoming shortly. The catalogue is considerably enlarged since it was last published in Lin. Trans. A. D. 1838. Some uncertainty still hangs over the intimate structure of the murine animals, but all the rest have been carefully allocated in the modern genera after full examination of their conformation, while their special habitats have been determined upon accurate information.

I have lately seen a critique by Mr. Ogilby of my labours in this department, but I cannot say it is distinguished by much candour. It is well known, that when Mr. Ogilby wrote, several successive catalogues of mine, embodying the improving results of new information, and greater skill in the appreciation of it, existed ; and had Mr. Ogilby

consulted the whole of these, *according to their dates*, he might have spared a great part of his censorial remarks. Let Mr. Ogilby consult the very first catalogue, and he will find, that most of his identifications of my so-called new species, with others recorded by authors, had been priorly indicated by myself. Let Mr. Ogilby have patience, and he will still find, that several of these species are really new. With regard to *Semnopithecus*, *Entellus*, *Papio Rhesus*, *Cercopithecus Radia-tus*, *Manis Macrourus*, *Cervus Equinus*, not I, but the late Mr Bennett, is answerable for the errors committed where such there be, as I have letters of his to prove: and so too, for the misappropriation in reference to *Felis Viverrinus*. Of that species, my specimens had reached London before Mr. Heath's, and been seen by Mr. Bennett, who had suggested to me the Viverrine likeness, which I was contending was confined to the head; when to my surprise, for Mr. Bennett was in general singularly fair and courteous, suddenly appeared the description of a novelty ascribed to Mr. Heath. Mr. Gray (apud Hardwicke) had meanwhile justly given the discovery of the species to me, though he retained Mr. Bennett's name for it; but as that name conveyed a false analogy, I have chosen to adhere to my own. In short, Mr. Ogilby's critique is rather too much like a comment on the well-known text, "Woe betide the local researcher, who presumes to judge of his own stores."

Valley of Nipal, Dec. 1841.

Proceedings of the Asiatic Society.

(Thursday Evening, 11th November, 1841.)

The Hon'ble Sir E. RYAN, President, in the Chair.

The Reverend WM. WINCHESTER, Chaplain of Berhampore, was proposed a Member by F. BEAUFORT, Esq. seconded by the Secretary.

Library and Museum.

Read the following Reports submitted by the Curator and Librarian.

The Curator's Report.

SIR,—My report for the month of October will be found to relate chiefly to a valuable donation of Quadruped and Bird skins, procured in the vicinity of Maulmain, which have been presented to the Society by Government, and to another collection of Bird skins from the Himalaya, for which we are indebted to the liberality of Dr. Spry, of the Bengal Medical Service.

The first of these collections contains six skins of Mammalia, pertaining to as many species, and 58 of Birds, which are referrible to 42 species. I have endeavoured to determine the whole series, and shall proceed to notice them in detail, adding such remarks as I conceive may be useful to students of Zoology in this country.

The Mammalia consist of two *Carnivora* and four *Rodentia*, which are as follow:—

1. *Urva cancrivora*, Hodgson, (Journal of the Asiatic Society of Bengal, 1837, p. 562,) or, more recently, *Mesobema cancrivora*, *ibid.* (Calcutta Journal of Natural History, No. 6, p. 214.)—The specimen has been mounted with considerable difficulty, from the unfortunately decayed condition of the skin, though the hair is uninjured, and its appearance now is fully as good as that of Museum specimens in general. I have also had its skull (which is quite perfect) taken out and cleaned. This, as noticed by Mr. Hodgson, is remarkable for having incomplete bony orbits, which is very rarely the case in the highly natural sub-family to which the animal strictly appertains, namely, the *Viverridæ Herpestidinae*. I do not myself perceive any peculiar affinity which it is said to bear to the *Gulina Mustelidæ*.

2. *Artictis Binturong*, Temminck; *Ictides Ater*, Valenciennes; and a juvenile brown variety, probably the ordinary dress of the young animal, *I. albifrons*, F. Cuvier.—The latter has usually been regarded as the permanent female colouring of the species, but a very old and much injured specimen of the female Binturong in our Museum, which now that the present specimen has been received, I have had the skull and limb-bones taken from, though sufficient to illustrate the fact here stated is retained of its skin, is equally black with the mature male. The Maulmain specimen is little more than half-grown, and retains its deciduary canines: its colour is black, with a grizzled whitish visage, occasioned by each hair having a subterminal yellowish-white annulation, which is likewise the case, more sparingly, on the limbs; while the belly and basal part of the tail underneath are of a dull reddish white, more or less of which, I believe, is permanent; ears white-edged, but the lengthened hair on their posterior surface black. This specimen was also in very bad condition, being much torn and decayed, but the hair is nearly perfect. Its skull has

been taken out, and we have now, therefore, two examples illustrating different ages of the skull of this highly interesting genus. It pertains to the restricted division of *Plantigrada*, which have two true molars on each side of both jaws, posterior to the *carnassier*, or scissor-tooth, a distinction serving, with other characters, to separate them (as a different natural group) from the Badgers and allied forms, which latter, associated with the Weasels and their allies, form another, equally distinct, that might be termed *Subplantigrada*: these have but one true molar in each jaw, posterior to the scissor-tooth; which latter is merely the hindmost of the *false* molars, and, as such, is represented by a deciduary tooth in the young animal, which is never the case with *true* molars. There are some genera in which the scissor-tooth can scarcely be determined except by this test, and the Binturong is one of them. Both divisions here indicated are distinguished from all the other *Carnivora* (Cuv.) by the absence of a *cæcum coli*, wherein they resemble the greater number of *Insectivora* (Cuv.) The absence of a *cæcum* is, indeed, assigned by Baron Cuvier as a character common to the whole of his *Insectivora*; but M. M. Diard and Duvaucel had long previously to the publication of the 2d edition of the *Regne Animal*, noted the existence of this viscus in the genus *Tupaia*, Raffles; * (*Cladobates*, F. Cuv.; *Glisorex*, Blainville; *Hylogale*, Tem.) and Dr. Andrew Smith has recently figured and described the *cæcum* with the other viscera of his genus *Macroschelides* (or *Erinomys*, Blainv.; *Rhynomys*, Lichtenstein): it may be expected to exist likewise in the genus *Gymnura*, Vig. and Horsf. (or *Echinosorex*, Blainv.), and also in the little known genus *Eupleres* of Doyère, figured, not long ago, in the *Annales des Sciences Naturelles*. The restricted *Plantigrada* consist of seven genera, whereof one—the Bears (*Ursus*)—comprises numerous living as well as fossil species, the former of which are distributed over Europe, Asia, the great Malay Islands, the Atlas chain in North Africa, the Andes in South America, and all North America; a fossil species is likewise found in Brazil: of the other six, two are peculiar to Asia, and the rest to America. The former are—the Panda (*Ailurus*, Duvaucel), or 'Wah' of Nepâl, chiefly known to inhabit the eastern Himalayas; and the *Binturong* (*Arctictis*, Tem., *Ictides*, Valenciennes), which is also found in Nepâl, and thence southward to Malacca: the latter consist of the Raccoons, (*Procyon*, Storr); the Coati-mondis (*Nasua*, Storr); the Kinkajou (*Cercoleptes*, Illiger); and the Bassary (*Bassaris*, Lichtenstein). Two of them are stated to have prehensile tails, namely, the Kinkajou and the Binturong: in the former of these, however, this organ is prehensile only in a very slight degree, (inasmuch that the term is quite inapplicable,) as I am enabled to state from personal observation, having seen a very tame Kinkajou loose in a room; this animal, as it clambered about the chairs, &c. merely pressed its tail occasionally and very slightly against whatever offered, stiffening it throughout its length in a slight downward curve, but never coiling it; but the Binturong, according to native accounts, twists its tail round a branch to give impetus to its spring, and then throws itself on its prey, generally Monkeys (whence its Burmese name of *Myouk kya*, or monkey tiger), and with it falls to the ground. Its head is said to be particularly hard, and that it cannot be killed by blows inflicted on it. "The present specimen," which is the individual now presented to the Society, "had several blows inflicted on it with a heavy bamboo, but not apparently to its injury: it was shot at the summit of a tree; and the natives say, that this animal is generally seen upon

* Asiatic Researches, vol. xiv, p. 474.

trees, living in the jungles, where it is very seldom observed." * The crania before me are by no means remarkable for solidity, and indeed that of the specimen referred to is fractured, doubtless from the blows mentioned; and it may be remarked that the tail of this creature has no naked space at its extremity, wherein it resembles those of the American Sajous (*Cebus*, Geoffroy). In the other genera of true *Plantigrada*, except the Bears which have scarcely any tail, this appendage is equally bushy throughout its length, and is always ringed with two shades of colour. Several of these animals have retractile claws, more or less so; as instanced in the Panda and Binturong, and in the Bassary. The last named elegant species has been erroneously approximated to *Parodaxurus*, among the *Viverridæ*, which family has no American representative. The Zoological Society possessed a living specimen at the time I left London, and as this genus is but very little known to most naturalists at present, I may be permitted to mention that it does resemble *Parodaxurus* not a little in external aspect, having the same elongated body, enabling it to spring from bough to bough with extreme lightness and agility, ruddered by its very bushy and squirrel-like tail. Its head resembles that of the Kinkajou, with the same Marten-like ears, and long extensible tongue, which latter is indeed common to the whole group, all of which are great devourers of honey and other sweets: but the Bassary would appear to be also highly predatory, and probably a good deal resembles the Martens in its habits. Its talons are very sharp and retractile; and the fur short and Lemur-like, as in the Kinkajou: colour greyish with a barred tail. What specimens have been obtained have all been brought from Mexico. Such is a slight survey of the group to which the Binturong belongs, and to which certain fossils are likewise referrible, as that figured in Pl. 150, figs. 2, 3, and 4, of the Ossements Fossiles of Baron Cuvier. The *Ictide Dorée* of Mons. F. Cuvier is a veritable *Parodaxurus*.

3. *Pteromys petaurista*, Auct:—being the first well authenticated example of this large dark species which I have seen from the eastward of the Bay of Bengal. It may, therefore, rather than *Pt. nitidus*, be the great Tenasserim species mentioned by the late Dr. Helfer; but it is probable that both inhabit the same forests. The *Pt. Oral* of Lieut. Tickell, elaborately described in the Calcutta Journal of Natural History, No. 7, p. 401, would appear to be no other than *Pt. petaurista*.

4. *Sciurus bicolor*, Sparrman.—A very fine specimen. Of this animal, which Dr. McClelland procured examples of in Assam, we are informed by Dr. Horsfield (in *Proc. Zool. Soc.*, for 1839, p. 151), that "individuals agreeing in all particulars with the Assamese specimens have been observed in other parts of India by Dr. Francis (Buchanan) Hamilton and by Dr. Finlayson. The latter forwarded several specimens to the Museum at the India House. The specific character originally constructed by Sparrman, and subsequently adopted by all systematic writers, defines accurately the animal as described by Dr. Hamilton and by Dr. McClelland. Schreber's figure also agrees with the same; while the animal from Java (represented in Horsfield's *Zool. Res.*, and indicated as a variety in Fischer's *Synopsis Mammalium*,) appears to differ from the continental specimens by the variations to which it is subject. It remains, therefore, for further research and observation to determine whether these two varieties may not be specifically distinct, and whether

* Captain McLeod, in Calcutta Journal of Natural History, No. 7, p. 453, from information supplied by the Rev. Mr. Barb.

the name of *Assamensis* proposed by Dr. McClelland should not henceforth be applied to the species observed in continental India by himself, and by Hamilton and Finlayson.* The present species is nearly allied to *Sc. maximus*, but differs from that animal and its Javanese analogue *Sc. Leschenaultii*, among other respects, by the constancy of its colouring; Dr. McClelland remarking that the description of it which he took was derived from seven or eight specimens, and that among the various individuals he had seen there appeared to be no difference. "All the upper parts are deep and glossy reddish-black, the cheeks and under-parts whitish tinged with fulvous, with two dark spots on the chin. Body fifteen, tail sixteen inches long." Our Museum contains a fine series illustrative of the variations of colour of *Sc. maximus*; and the skulls of both the present and the foregoing species (*Pteromys petaurista*) have been taken out, for purposes of comparison with their proximate allies. That of *Sc. bicolor* is much smaller, and otherwise differs considerably from the skull of *Sc. maximus*.

5. *Sciurus* ——— ?—Undetermined, but, I believe, a species which I have seen before, in England. Dr. Spry possesses a living specimen of it from Arracan. Length 10 or 11 inches, the tail, with its hair, 1 foot or nearly so; ears slightly tufted with whitish, denoting the hyemal dress. Colour grizzled fulvous-brown, purer fulvous on the sides of the neck, and less so on the head and croup; fore-limbs and hind feet ashy, the tail slender and black-tipped, and the under-parts and inside of the limbs whitish-grey; whiskers black and strong. This species is very common along the Tenasserim coast.

6. *Rhizomys cinereus*, McClelland, (Calcutta Journal of Natural History, No. 7, p. 496,) genus *Nyctocleptes* of Temminck.—The researches of naturalists in this part of the world are fast bringing to light additional species of this curious genus, which, till lately, was only known to contain the *Rh. Sumatrensis*, Gray, (or *Mus Sumatrensis*, Raffles,* *Spalax Javanus*, Cuvier, and *Nyctocleptes*—?, Temminck,) and the *Rh. Sinensis*, well figured in one of the late Major General Hardwicke's drawings, edited and named by Mr. Gray. The latter species has been discovered to inhabit the Phillippine Islands by Mr. Cumming—(vide *Proc. Zool. Soc.*, 1840, p. 62.) A third has been made known by Mr. Hodgson as an inhabitant of Nepál (*Rh. badius*, Hodgson); and the present species is described to me by Mr. Barb to be the smaller of two inhabiting the Tenasserim provinces. Moreover, two if not three species, according to Dr. McClelland, are contained in a zoological collection of much interest, recently made in Assam by Mr. H. Walker, and which is now under that gentleman's investigation. An additional interesting notice of the Nepàlese species has been published by Mr. Hodgson (in Calcutta Journal of Natural History, No. 7, p. 411). The fact there stated of this creature's tameness when first caught, and not offering to bite with its formidable front-teeth, is observable in even most other Rodents, though the genera *Mus* and *Sciurus* form conspicuous exceptions to it: the large Water Vole of Europe may be handled with perfect impunity. With respect to the food of the species of *Rhizomys*, which is known to consist of roots, and especially those of bamboo, I would call attention to an observation of the Rev.

* Dr. McClelland inclines to doubt the identification of Mr. Gray's animal with that of Sir Stamford Raffles, and which is figured in one of the late Colonel Farquarson's drawings, preserved in the Museum of the London Asiatic Society, where I have seen it. vide *Loc. Cit.*

Mr. Bree, relative to the common Rat (*Mus decumanus*), to suggest the probability of the same remarkable mode of feeding being resorted to in the present instance, which the great power of the jaws and strength of the gnawing teeth seem to render very likely. Mr. Bree describes the attacks of the Rats upon his "young oaks in a plantation near a brook and small pond. They gnaw the tree off just below the ground; sometimes nearly as level as if it had been cut with a saw. Young trees nearly as thick as my wrist," he states, "have been served in this way; and I have been quite astonished how the Rats could cut them through so completely. The fact is, the Rat begins his operations underground, and eats upwards as far as he finds the wood soft enough for his purpose, which is just below the surface: the consequence is, that the tree will often remain erect, and appear to the eye as if nothing had happened to it; but of course it throws out no leaves in the spring, and, on taking hold of it, you find it loose, and ready to come up with a touch."* The same has been observed of young willows growing in a somewhat marshy soil, and been referred, as I believe erroneously, to the operations of the Water Vole. According to the information supplied to Captain McLeod by Mr. Barb, the *Pouè* (*Rhizomys cinereus*) is an animal rarely seen, and is found in the more hilly parts of the country. The Burmans eat the animal when they can catch it. It burrows very rapidly, and spends the day time in holes, living on the roots of the bamboo generally, but towards night-fall it comes out and amuses itself by cutting the bamboo down, which it does very expeditiously. It does not take to the water at all.† Mr. Hodgson was informed that the Nepalese species constructed burrows under the roots of trees or shrubs, and that they may be taken almost as easily as a domestic animal, from their extraordinary boldness or apathy. An interesting notice follows, of an individual which that naturalist possessed alive.

Of the foregoing six Quadrupeds, the *Urva*, the two Squirrels, and the *Rhizomys*, are new to our Museum; the *Pteromys* was represented only by an imperfect skin, noticed in my last report; and the Binturong is equally acceptable, as replacing, till we can get a still better one, the very old and shabby specimen already mentioned.

Of Birds, there are two species of the restricted order *Scansores*, or Parrots; viz.

1. *Palæornis Pondicerianus*, Vigors, or *Psittacus mystaceus* and *bimaculatus*, Shaw; which, though procurable in any number in Calcutta, is new to our Museum; and

2. *Psittacula vernalis*, Swainson.—The small Crimson-rumped Lorikeet, which is also a common bird in India. Both these species, and the former especially, as I am informed by Mr. Barb, are very common on the Tenasserim coast, where also are found four other species of *Palæornis*, namely, *P. Alexandri*, *torquatus*, *Bengalensis*, and *Avitorquis*.

The only Raptorial species sent is—

3. *Athene cuculoides*; *Noctua cuculoides*, Vigors.—Which is also very common, and much persecuted, and even frequently killed by the Crows (*Corvus splendens*, Vieillot, or better named *C. impudicus*, Buchanan; the common Crow of India).

Of the order *Insectores*, and first great division of it—*Heterogenes*, I find, among the *Syndactyli*, technically so styled, two species of *Buceridæ*, three of *Halcyonidæ*, and two of *Meropidæ*, viz.

* Gardener's Magazine, vol. vii. p. 235, and Magazine of Natural History, vol. vii. p. 456.

† Calcutta Journal of Natural History, No. 7, p. 457.

‡ Ibid. p. 411.

4. *Buceros ruficollis*, Vieillot.—Mr. Barb assures me, that there are two races, or perhaps species, of this Hornbill, which differ only in the colour of the naked skin of the throat and around the eyes, which in one is of a beautiful blue, and in the other an equally rich yellow. Both are very common, associating in flocks of a dozen or twenty birds, but the two do not mingle in the same flock. The *B. Nipalensis* (Hodgson) was not recognised by Mr. Barb as an inhabitant of Tenasserim.

5. *B. leucogaster* ? Nobis, n. s. ? Length about two feet, of wing from bend $9\frac{1}{2}$ inches, tail the same; beak $3\frac{1}{2}$ in. long, and, with casque, 2 inches deep; the latter sub-carinated, and narrowing and diminishing anteriorly to where it terminates, but little abruptly, beyond the middle of the upper mandible, as if a young bird (which Mr. Barb assures me it is not). All the upper parts wholly black glossed with green, except the tips of the wing-primaries and secondaries, and of the tail feathers, exclusive of the uropygial pair, which are white; belly and thighs also white, as is likewise the inside of the shoulders of the wings: coronal and occipital feathers elongated. Beak yellowish white; and tarse greenish. This species associates in large flocks, and is even more common than the last. A still smaller black species, with a similar casque, and the common Indian *B. Malabaricus*, are stated by Mr. Barb to be also common in Tenasserim; while the great *B. Homrai*, Hodgson, is likewise found there, but more sparingly, and differs from the rest in never flocking but keeping in pairs, and avoiding human habitations. The *B. Rhinoceros* was not recognised by Mr. Barb as an inhabitant of Tenasserim.

6. *Alcedo Bengalensis*, an adult and two young specimens.—This common Indian species is contained in a collection made by Dr. Cantor in Chusan. It abounds in Tenasserim.

7. *Halcyon Cupensis*.

8. *H.* — ?—The Goorial of the Sunderbunds of Bengal.

9. *H. Coromandus*, *Alcedo Coromandus*, Sonnerat.—The *H. atricapillus* and *H. Smyrnensis* are likewise recognised by Mr. Barb, as being, with the three former species, common in Tenasserim; and all are stated by him to be very piscivorous, which is a fact not generally known of the restricted Halcyons. *H. rudis*, was observed by Mr. Barb at Rangoon.

10. *Coracias affinis*, McClelland and Horsfield (*Proc. Zool. Soc.*, 1839, p. 164.)—I am informed that this bird is not unfrequent in Bengal.

11. *Bucia Athertonii*: *B. Nipalensis*, Hodgson; *Nyctiornis Athertonii*, Swainson; *Merops Athertonii*, Jardine and Selby; *M. cyanopterus*, Jerdon (*Madras Journal*, No. 27, p. 228.)—Both this species and *B. amictus* are stated by Mr. Barb to occur, though rarely, on the Tenasserim coast. The latter is, I believe, more frequent in the Malay peninsula. The *Coracias Indica*, *Merops Indicus*, and *M. Sumatranus*, are also recognised by Mr. Barb as inhabitants of Tenasserim. *Upupa Epops* is very abundant.

Among the *Zygodactyli*, technically so denominated, I find in the collection

12. *Bucco Indicus* and *rubricapillus*, Latham, *B. Phillippensis* and *flavicollis*, Vieillot. A very abundant species in Bengal, and, I believe, throughout the Indian Peninsula. It is equally common in Tenasserim, where, however, the *B. cyanops*, so plentiful in Bengal, was not observed by Mr. Barb.

13. *Picus occipitalis*, Vigors.

14. *P. squamatus*, Vigors; *P. dimidiatus*, Gray, not of Temminck.—Immature plumage, having the crown and occiput more scarlet than in the adult, the breast a little streaky, and the under-parts marked but obscurely. This and the preceding species, which are nearly allied to the two green Woodpeckers of Europe, are included with them in the subgeneric division *Gecinus* of Boié.

15. *P. tiga*, Horsfield, *Chrysnotus tridactylus*, Swainson.—The Indian Three-toed Woodpecker. This bird only differs in plumage from the *P. Shorii*, Vigors, as figured in Gould's Century, by wanting the defined brown markings on the throat and fore neck; and as there is some tinge of the same about the throat, and on the sides of the neck, of the present specimen, I incline to consider them identical. This three-toed species is not particularly allied to the three-toed Woodpeckers of the North, which essentially pertain to quite a different section of the genus—the *Dendrocopus*, Swainson; but it closely approximates to the common *P. Bengalensis*, which has a minute inner back toe, and is intermediate in plumage to that species and another and larger Woodpecker in our collection, (the *P. Sultaneus*, Hodgson,) which has a proportionately much larger beak, and a full-sized fourth toe; from the latter, the only marked difference of plumage consists in the three-toed species having the hind neck black (as in *P. Bengalensis*,) instead of white; while from the other it differs more conspicuously by its crimson rump, and the uniform golden orange colour of the wings externally. All three are stated by Mr. Barb to inhabit the Tenasserim provinces.

16. *P. badius*, Raffles; *P. brachyurus*, Vieillot and Wagler; *P. rufus*, Gray, not of Wagler.

17. *P. (Meiglyptes*, Sw.,) *poioccephalus*, Temminck: an adult male and young female specimen. Common in Tenasserim, as are all the other Woodpeckers which have been mentioned.

18. *Oxylophus* — ?—Undetermined. I believe, a well known species, but the name of which I have not been able to ascertain. Length 17 inch, of wing from bend $6\frac{1}{2}$ inches, and tail 10 inches. Beak $1\frac{1}{8}$ inch from forehead, and tarse posteriorly 1 inch. Coronal feathers elongated. Upper parts blackish-brown having a green shine, except a half collar of white at the back of the neck; under-parts white, tinged with rufous on the throat, fore-neck, and under surface of the wings anteriorly; lower tail-coverts dusky-black; primary and secondary quills and their coverts deep ferrugineous, the tail feathers slightly tipped with whitish. Beak blackish horn-colour; and legs greenish plumbeous. This bird is common in Tenasserim, where the *O. edolius*, which is numerous in Bengal, was not observed by Mr. Barb. It would appear to be nearly allied to *O. Coromandus*.

19. *Phœnicophæus longicaudatus* ? Nobis, n. s ?—Length $23\frac{1}{2}$ inches, of wing from bend 6 inches, and middle tail feathers $15\frac{1}{2}$ inches, the outermost $5\frac{1}{2}$ inches, and the rest evenly graduating. Beak $1\frac{1}{8}$ inch from forehead, and tarse posteriorly $1\frac{1}{4}$ inch. General colour dark greenish-grey; the wings and tail shining dark-green, with a white tip to each tail-feather; front of the neck and breast paler, passing into whitish on the throat and immediately around the naked space encircling the eye, these whitish feathers having dark shafts, which terminate in a slightly prolonged hair-like bristle; small anterior portion of the lores black. Beak bright-green, and legs dusky. A common species in Tenasserim, and always seen in pairs. Th *Centropus pyrrhopterus* is also very common there, as in India generally.

Of *Heterodactyli*, this collection contains only

20. *Trogon Malabaricus*, Gould, *Tr. fasciatus*, Gmelin, *Tr. Kasumba*, Raffles, *Tr. Blonda*, Tem.—An immature male, being the first specimen of this gorgeous genus in our Museum. It is remarkable that the Trogons differ from all other yoke-footed birds (or which have two toes directed forwards and two backwards) in the circumstance of the ordinary inner fore toe being reversed, instead of the outer; in consequence of which, that which corresponds to the middle front toe of the generality of the class (or such as have three toes directed forwards) becomes the inner of the two anteriorly directed toes, instead of the outer as usual, and the ordinary back toe becomes the outer, instead of the inner, of those behind. The *Trogon Malabaricus* is common in Tenasserim.

Among the *Cantrices*, or second grand division of *Insessores* (which have the general organization of singing birds, whether or not they happen to sing), the following species occur:—

21. *Pica (Dendrocitta) vagabunda*, Gould.—Three young specimens. A common species, as in India; but *D. Sinensis* not recognized.

22. *Ianthocincla leucolophos?*, var.; or perhaps a very closely allied species; differing only in having the whole back, wings, sides, vent, and lower tail-coverts ferruginous, which colour is usually confined to the nape and sides of the neck, passing downward to cross the breast; while the white of the under parts, also, of the present bird, instead of abruptly terminating at the lower part of the breast, is continued down the middle of the belly. Also common, occurring in considerable flocks.

23. *Kitta venatorius*, Gray and Hardwicke.—Two adult and three young specimens: considered to be a rare species. The irides are bright red.

24. *Dicrurus refifer*, Vieillot.—Three specimens, but moulting their long exterior tail feathers. This shewy bird is abundant in Tenasserim, as are also *D. balicassius*, a smaller species nearly allied to this, and *D. viridescens?* (*Edolius viridescens*, Gould); but the elegant *D. krishna*, which I observe to be common in the vicinity of Calcutta, was unknown to Mr. Barb.

25. *Lamprolornis chalibeus*, Horsfield.—Common.

26. *Graucalus Papuensis*.

27. *Eurylaimus nasutus*, Tem.; *Cymbirhynchus nasutus*, Vigors.—Two specimens; being the only species of *Eurylaimus* observed by Mr. Barb. The beak and eyes are very beautiful blue, the former fading within a day or two after death. It is common in watery situations, and suspends its nearly globular nest, which is constructed of small twigs, from the branches of trees growing directly out of the water; the eggs are four in number, and pale spotless blue.

28. *Muscipeta Indica*, Stephens, *M. castanea*, Temminck.—Female.

29. *Muscicapa cærulea*, Vieillot, *M. occipitalis*, Vigors; female: which is the *M. cæruleocephala*, Sykes.

30. *Pitta brachyura*, Auct.—Two specimens.

31. *P. melanocephala*, Wagler.

32. *P. gigas*, Temminck.—Apparently in nestling plumage. All these birds are common in Tenasserim.

33. *Oriolus melanocephalus*, Linn.—Three specimens.

34. *O. Chinensis*, Gmelin.—Two specimens.—

35. *Chloropsis Malabaricus*, Jardine and Selby.

36. *Cinnyris Vigorsii*, Sykes.—Being a new locality, I believe, for this beautiful little species. It is common in Tenasserim.

37. *Anthreptes rectirostris* : *Cinnyris rectirostris*, auct; *C. elegans*, Vieillot.

The remainder consist of a Pigeon, a Jungle Fowl, two Storks, and a Duck; viz.

38. *Carpophaga aenea*: besides which, the *Columba (Turtur) Javanica* and *tigrina*, and *Vinago bincta* (Jerdon) and *V. sphenura*, are recognised by Mr. Barb as inhabitants of the same region.

39. *Gallus pseudhermaphroditus*, Nobis, n. s.?—A very singular bird, which, if I was not positively assured was a male in normal plumage, I should have suspected to be either an individual of mingled sex, or possibly an aged male; for that it is not a female in partially masculine attire is evident from the size of its comb and wattles, and especially of its spurs. Size of an English game cock, or larger than the male *G. Bankivus*, having much stouter legs, the spurs of which are $1\frac{1}{2}$ inch long; comb and wattles as in the *G. Bankivus*, but the former more entire towards the front (possibly a mere individual diversity): the tail is that of a cock bird of this genus, but scarcely more developed than in the *Euplocomi* (as *Eu. albocristatus*); in other respects the plumage is altogether that of an ordinary brown hen, having a redder cast than in the female *G. Bankivus*, especially on the wings; tail coloured as in an ordinary male. Length about 2 feet, of which the middle tail feathers occupy 10 inches, wing from bend 9 inches, and tarse behind, to back toe, $2\frac{3}{4}$ inches. I am informed that this species is never clad in the usual bright plumage of the other male birds of its genus.

40. *Ciconia leucocephala*, *Ardea leucocephala*, Auctorum; *Ciconia umbellata*, Wagler.

41. *C. nudifrons*, Jerdon.—The Bald-fronted Adjutant, which I observe to associate with the common Bengal species about Calcutta, where, however, it is comparatively rare. The present specimen is young, and has some lengthened occipital feathers, which seem to disappear gradually with age. Our Museum contains a very fine specimen of the adult of this species.

42. *Microcygna girra*.

Besides these 42 species sent, 14 of which are new to our Museum, and such as have been mentioned with their congeners as inhabitants of the Tenasserim provinces, the following have been recognised in our Museum by Mr. Barb, as species more or less common in the same region: *Milvus Cheele*, *Cercus melanoleucos*, *Gracula religiosa*, *Sturnus contra*, *Pastor cinereus* (Jerdon), *P. tristis*, *P. cristatellus*, *Parus monticolus*, *Copsychus saularis*, *C. macrourus*, *Phaenicura fuliginosa*, *Cryptolopha poiocephala*, *Rhipidura Albofrontata*, *Spermestes melanocephalus*, *Tantalus leucocephalus*, *Ibis papillosus*, *Pluvianus Goensis*, *Rhynchops flavirostris*, and *Dendrocygnus awsueree*.

I now pass to the Himalayan collection of Bird skins, from which Dr. Spry has kindly permitted me to select what species were new to the Museum, and for which I have exchanged certain duplicates that were not required. Our acquisitions this way consist of

1. *Palaeornis schisticeps*? mentioned in the catalogue of Dr. Royle's birds: size of *P. torquatus*, and nearly allied to *P. Bengalensis*, but having a dull lavender-coloured

head, and black chin and nuchal ring bordering the lavender tint. General colour of the upper parts vivid green, a little paler underneath, and not yellowish as in *P. Bengalensis*, but tinged about the nape with verditer; maroon wing-spot as in *P. Bengalensis*; and tail wholly yellow underneath, the two middle feathers green above near the base, then bright blue, and the terminal third yellow; the other tail feathers all yellow on the inner web and tip, having the rest of the outer web green. Upper mandible bright vermillion as far as the notch, its tip and the whole lower mandible yellowish-white; feet as usual. Length 16 inches, of which the tail occupies $9\frac{1}{2}$ inches, its middle pair of feathers reaching $2\frac{1}{2}$ inches beyond the next pair; wing from bend $6\frac{1}{2}$ inches, and tarse $\frac{1}{2}$ inch.

2. *Picus squamatus*.—Female; having the crown and nape black instead of red.

3. *P. Himalayanus*, Jardine and Selby; an immature female.

4. *P. brunnifrons*, Gould and Vigors. Male and female. The collection contained four specimens of this species.

5. *Myophonus Temminckii*.—One of seven specimens.

6. *Turdus viscivorus*.—The European Missel Thrush, one of three specimens, and selected for the purpose of shewing a veritable Himalayan example of this well known bird.

7. *Petrocincla erythrogastra*; *Turdus erythrogaster*, Vigors.—A bad specimen, but we had previously only the female of this fine species, of which the present collection contains also an example.

8. *Orocetes cinclorhyncha*, G. Gray.—Examples of the summer and winter dress of this bird, selected from ten specimens; the whole of which according to their plumage, it may be presumed that there is no sexual diversity of colouring, as might be suspected from its near affinity to the Redstarts. The only seasonal difference consists in the feathers being slightly margined in winter with brownish on the back, and the blue coronal feathers with dusky. The Museum contains an example of this bird in nestling plumage.

9. *Cinclus Pallasii*, Auct.—The Himalayan Dipper, adult and young. A welcome addition to our collection, but the young bird especially is in very unsatisfactory condition.

10. *Enicura maculata*. One of three specimens, and selected from its appearing to present the opposite sex to that previously in the Museum.

11. *Muscipeta paradisea*. Female. A bad specimen, but which will serve to fill the place of this species until better examples of both sexes can be procured.

12. *Lanius erythronotus*.—One of two specimens.

13. *L. Hardwickii*.—Both these species were labelled "Indian Mocking bird." Several of the Shrikes have been frequently stated to repeat the notes of other birds with much facility.

14. *Coccothraustes icterioides*. Female. The sombre plumage of this sex was wanting in our Museum, where, however, there is a fine male, and the present collection contains two other males.

15. *Columba leuconota*, Vigors.

16. *Lophophorus impeyanus*.—Male and female; the collection containing five females and four males of this resplendent bird.

17. *Phasianus Wallichii*: *Lophophorus Wallichii*, Hardwicke; *Ph. Stacei*, Vigors and Gould.—Male and female; of which species, four males and two females were sent.

The remainder of this collection consists of *Alcedo Bengalensis*, *Bucco grandis* (2), *Pica* (*Cyanocorax*) *erythrorhynchos* (2), *P.* (*Dendrocitta*) *Sinensis*, *Garrulus gularis* (5), *Nucifraga hemispila* (3), *Ianthocincla variegata*, *Oriolus aureus*, *Muscicapa cærulea*, *Phœnicornis brevirostris* (3), *Euplocomus albocristatus* (2), *Eupl. Pucrasia*, *Tragopan Hastingsii*, *Francolinus vulgaris* (3), and *Perdix Chukar* (2).

I have also to acknowledge the donation of a fresh Chinese Lory (*Lorius Sinensis*) from P. Humphrey, Esq., and of a living specimen of a Hawk (*Elanus melanopterus*), in immature plumage, from W. Frith, Esq.

The following species of Birds have been procured in the neighbourhood :—

1. *Mitvus Cheele*.—Female.
2. *Strix flammea*.—Male.
3. *Halcyon* —?—The Goorial, male.
4. *Coracias Indica*.—Male.
5. *Merops Indicus*.—Male.
6. *Bucco cyanops*.—Two specimens, males.
7. *B. Indicus*. Two specimens, males.
8. *Picus Bengalensis*.—Male.
9. *P. Macei*.—Male.
10. *Oxylophus edolius*.—First plumage.
11. *Dicrurus Crishna*. (*Edolius Crishua*, Gould). Female.
12. *Pastor cinereus* (Jerdon).—Male and female.
13. *Iora tiphia*.—Young male.
14. *Lanius Collurio*? *verus*.—Young male.
15. *Hæmatornis Caffer*.—Two males.
16. *Copsychus Saularis*.—Male.
17. *Geocichla citrina*.—Male.
18. *Oriolus melanocephalus*.—Two males and a female, illustrating different states of plumage.

19. *O.* —? n. s.?—Female; having no black whatever about the visage. This specimen is now alive in a cage.

20. *Cebilepyris melaschistos*; *Volvocivora melaschistos*, Hodgson: female.

21. *Cinnmyris sola*.—Male, female, and young.

All the above (save the living Oriole) have been examined internally, the sternal apparatus of the greater number prepared, and minute descriptions have been taken of them in the recent state, noting the fugitive colours of the feet and other naked parts, that of the iris, &c. On dissecting the Barbets, I found a very close approximation in general structure to the Toucans of South America, much more than to the Woodpeckers, in immediate proximity to which latter the Barbets have been always arranged: excepting the bill and tongue, the internal conformation of the Barbets seems to be altogether that of the Toucan, even to the singular character of the imperfection of the clavicles, which do not join to form a *furcula* (or 'merry thought') as in other birds, but exist as small dagger-shaped bones, about half their ordinary length; nor do the bill and tongue of the Barbets possess any resemblance to those of the Woodpeckers, as obvious enough in the instance of the former, while the tongue is merely a flattened lamina of the ordinary shape and size, a little furcate at the tip, being more distinctly so in *B. cyanops*, and less noticeably in the small *B. In-*

dicus. The African genus *Indicator*,* on the other hand, which has been currently classed with the Cuckoos, appertains strictly to the natural family *Picidæ*. The only other birds I know of, wherein the clavicles do not join and form a *furcula*, besides the *Struthionidæ*, properly so called, in which they are curiously modified, are the Touracoes (*Corythæ*) of Africa (and doubtless the allied genera *Musophaga*, *Chizæris*, and *Colius*), in three different species of which I have found the clavicles to be separate, though all but joined; and various *Psittacidæ*, in which they are altogether wanting. They vary in proportionate length in different species of Toucan (*Rhamphastos*), but have been figured by l'Herminier as united in the closely allied *Pteroglossus Aricari*.

In the class of Mammalia, we are indebted to Lieutenant Tickell for two fine pairs of Deer-antlers, belonging respectively to the Sambur (*Cervus Hippelaphus*), and Axis (*C. Axis*).

In that of Reptiles, I have procured three specimens respectively of two species of Snake, and some examples of an *Anolis* common in the neighbourhood. The former are—

Psammophis cerasogaster, Cantor:—which is considered by that naturalist rather an uncommon species, and is new to the Museum; and

Tropidonotus dora, Cantor; *Dora* of Russell; *Coluber Dora*, Daudin.

Osteology.—The skeleton of the Rhinoceros, noticed in my previous report, has been remounted, and is again in its place. It is unfortunately deficient in the digital bones of all four extremities, in the sternal pieces, the penultimate pair of ribs, and one of the diminutive last pair. We possess, however, a skeleton foot of a Rhinoceros, presented to the Society by Dr. Pearson.

A skeleton of a Bat, *Scotophilus castaneus*, has also been prepared and set up, and also the skulls of the following species of *Vespertilionidæ*:—

Scotophilus castaneus.

Taphozous longimanus.

T. brevicaudus, Nobis, n. s.

Megaderma lyra, and

Dysopus plicatus (?).

Also skulls of

Canis aureus.

Vulpes montanus.

Urva Nipalensis.

Paradoxurus typus.

Arctictis Binturong.—Two specimens.

Pteromys petaurista.

Sciurus maximus.

Sciurus bicolor.

Sciurus—? Undetermined.

Mus—? Undetermined.

Gerbillus Indicus.

Georychus fuscocapillus, Nobis, n. s.

* Since writing this, I have met with a Himalayan species of true Honeyguide—*Indicator xanthonotus*, Nobis.

The skeleton of the Hoolock, or White-browed Gibbon, is prepared, and quite ready for mounting, as also that of a Crow (*Corvus splendens*); and skeletons of two species of Barbet, of a Snipe (*Scolopax heterura*), and of *Cinnyris Sola*, are in course of preparation. In addition to the sternal apparatus of most of the birds already mentioned, as having been procured in the recent state, we are indebted to Mr. Bouchez, for that of a Monaul (*Lophophorus Impeyanus*), that of a rare Hawk (*Hyptiopus lophotes*), and of one of the Australian broad-tailed Parroquets (*Platyercus eximius*).

In the Botanical Department of the Museum, I have nothing to report.

The Librarian's Report.

SIR,—The report I have the honour to submit to the Committee for the months of September and October is as follows :—

I received on the 27th September 23 gems from the Secretary, which were deposited in the medal cabinet.

Almost all the books in bad condition, a list of which I sometime ago laid before the Committee, have been rebound or repaired.

Though the expence incurred is great, the preservation of so many valuable works for the use of the Members of the Society and the community at large, will be more than adequate compensation.

A great number of duplicates have been selected from the shelves. Should it appear desirable to the Committee, these might be sold or exchanged for others, and as many of them are valuable books, perhaps the Members of the Society might wish to take some of them and give others in their stead.

The classification of the catalogue has been completed in the month of September, a copy of which is nearly ready for the print, and the arrangement of the library has been also finished.

I add a paper containing a general view of the classification of the catalogue.

The classification was, on the whole, made according to the plan I had the pleasure of proposing to the Committee. Such deviations from it only were thought advisable which bore a stricter correspondence with the principles according to which the classification was framed; and I may here mention it generally, that in the progress of the arrangement those principles were more and more rigidly adhered to, as this was found not only in more accordance with the natural divisions of science, but likewise better adapted to satisfy the demands of convenience.

The alterations alluded to are chiefly the following :—

There are at present only two main divisions, one containing the classic literature, the other that of the modern languages.

The science of medicine has found its more congenial place at the end of the natural sciences, instead of being connected with the three first divisions.

An alphabetical list of the titles of the books and of the names of the authors will be added to the catalogue, so that in finding the books every facility will be afforded to those who wish to avail themselves of the advantages of the library.

With regard to the collection I would remark, that, as it has been made mostly by valuable donations from generous individuals desirous of advancing the interests of the Society, no arrangement has been made to obtain all the standard works relating to each branch of knowledge, so that there are necessarily many deficiencies in the libra-

ry, which it seems desirable to supply. It would perhaps be well first to complete those divisions of the library which relate to natural science in general, and likewise those which refer to the history, civilization, languages, &c. of Asia.

I beg to submit to the Committee, if it be desirable, that all the books at present out, should be returned, at least for a short period, as the arrangement of the library cannot be completed till their titles and contents are ascertained. At the same time I would ask, if it be not advisable to call in the books once a year for the space of five or six days, that it may be known, whether they require repairing or any of them have been lost.

2d November, 1841.

I have the honor to be, Sir,

Your most obedient servant,

E. ROER.

Ordered,—That the three propositions,

1st. That the duplicate copies selected be either sold or exchanged;

2d. That the books now lent out be returned for a short time; and

3d. That the books be called in once a year for examination, submitted by the Librarian, be referred to the Committee of Papers.

A.

CLASSIC LITERATURE.

A. Greek Literature.

1. Philosophy.
2. History.
3. Geography.
4. Miscellaneous.

B. Roman Literature.

B.

Modern Literature, from the commencement of the Christian era to the present age.

I. Theology.

A. Polytheism.

- a. Special forms of Polytheism.
 1. Religion of Egypt.
 2. ——— of the Greeks.
 3. ——— of Zoroaster.
4. Brahmanism.
5. Buddhism.
6. Religion of Confucius.
- b. Polytheism in general.

B. Monotheism.

- a. Judaism.
- b. Christianity.
 1. Holy Scriptures and parts.
 2. Biblical Criticism and Interpretation.
 3. History of the Church.
 4. Miscellaneous Works.
- c. Mahomedanism.

II. Law and Jurisprudence.

- III. Philosophy.
- IV. Mathematics.
- V. Natural Sciences.
- A. Natural Science in general.
 - a. History.
 - b. Journals and Cyclopædical Works.
- B. Branches of Natural Science.
 - a. Natural Philosophy.
 - 1. Natural Philosophy in general.
 - 2. The branches of Natural Philosophy.
- A. Pneumatics.
- B. Hydrostatics.
 - j. Crystallography.
 - 8. Sound.
 - r. Heat.
 - y. Light.
 - y. Electricity.
 - a. Magnetism.
 - b. Astronomy.
 - c. Geology.
 - d. Chemistry.
 - e. Natural History, and Natural History in general.
 - f. Branches of Natural History.
 - 1. Mineralogy.
 - 2. Botany.
 - 3. Zoology.
 - a. Zoology in general.
 - b. Branches of Zoology.
 - f. Anatomy.
 - g. Physiology.
 - h. Medical Science.
 - 1. History of Medicine.
 - 2. Pathology.
 - 3. Therapeutics.
 - 4. Materia Medica.
- VI. Applications and Arts.
- VII. Historic Science.
- A. History.
 - a. General History.
 - 1. Chronology, Dictionaries, Journals, etc
 - 2. Universal History.
 - b. Special History.
 - 1. Of Antiquity.
 - 2. Of the Asiatic Empires.
- B. Of Greece.
- j. Of Rome.

- r. Of the Middle Ages and of Modern Times.
- A. Of the Occidental Empires.
- B. Of the Oriental Empires.
 - a. General History of the East.
 - b. Special History of the East.
 - Of the Huns.
 - Of the Mohummedan Empires.
 - 1. Of the Arabs.
 - 2. Of the Moguls.
 - 3. Of the Sultauns of Egypt.
 - 4. Of the Turks.
 - 5. Of Persia.
 - 6. Of Hindoostan.
 - 7. Of China and Japan.
- C. Of America.
- D. Of Africa.
- B. Biography.
- C. Voyages and Travels.
- A. History of Travels, Voyages round the World, and Collections of Travels.
- B. Travels in various parts of the World.
 - a. Travels in Europe.
 - 1. To various parts in Europe.
 - 2. To special parts of Europe.
 - b. Travels in Asia.
 - 1. Travels in Asia in general.
 - 2. Travels in Western Asia.
 - 3. Travels in Central Asia.
 - 4. Travels in Eastern Asia.
- S. Travels in India, and Voyages to India.
 - c. Travels in Africa.
 - d. Travels in America.
 - e. Travels to the Polynesian Ocean.
- C. Geography and Statistics.
 - a. General Geography.
 - b. Special Geography.
 - 1. Geography of Europe.
 - 2. ——— of Asia.
 - 3. ——— of Africa.
 - 4. ——— of America.
 - 5. ——— of Polynesia.
- E. Archæology and Antiquities.
- VIII. Languages.
 - A. Grammar.
 - a. Comparative Grammar.
 - 1. Grammar of European Languages.
 - 2. Grammar of Oriental Languages.

- d. Of the Semitic Languages.
 - B. Caucasian Languages.
 - Of Indian Languages.
 - 1. Of the Sanscrit.
 - 2. Of the Pali.
 - 3. Of the Modern Indian Languages.
 - S. Of the Chinese Language.
 - B. Dictionaries.
 - C. Critics and Interpretations.
 - D. Literature.
 - E. Catalogues.
 - IX. Miscellaneous Works.
 - A. Works.
 - B. Journals, Encyclopædias, etc.
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Read two letters, dated the 29th September and 20th October last, from Mr. Secretary Bushby, the first transmitting a communication from Mr. A. T. Christie, late of the Medical Service, Madras Establishment, reporting his Geological Researches in that part of India, and the second transmitting copies of Papers by Captain G. B. Tremeneere, Executive Engineer, Tenasserim Division, on the Tin Grounds and Manganese Beds of the Mergui Province.

Read also two letters from Mr. H. Cope, dated the 4th and 5th October last, on the subject of the investigation of the Himalyan Lichens.

Read letter from Mr. J. G. Bruce, of 18th October 1841, on the subject of the Nurma Cotton produced in Malwa, elicited with reference to the remarks of Mr. H. Piddington, and noticed in a recent number of the Journal.

Ordered,—That the foregoing Papers be made over to the Secretary in his capacity of Editor, for publication in early numbers of the Journal of the Asiatic Society.

Read letter from Captain S. R. Tickell, with sketches of Idols.

Read letter from Baboo Ramcomul Sen, of 3d November 1841, with a number of Copper Coins, presented to the Asiatic Society by Dr. R. Stuart of the Native Hospital, who, in sending them, writes: "I have much pleasure in forwarding the accompanying Copper Coins, which were given to me as curiosities. When they are really old, I know they possess much value in the eyes of such as wish to be thought antiquarians; how far those I send may be deemed valuable, I do not pretend to judge."

Read letter from J. H. Batten, Esq. of 4th October 1841, forwarding some "Loose Leaves" from Thibet, brought down by Deboo, Putwares of the Juwater Pars (one of the chief Bhotias), who got them from some man in Heoondes (the Thibet name of Kemaon.)

These "loose leaves" having been submitted for Report to Mr. Csoma, that gentleman writes,

"I beg to inform you that the 24 loose leaves (of blue paper, with Tib. capital character on, written with orpiment, under the following numbers of leaves: 5, 6, 8, 10,

21, 40, 46, 53, 58, 60, 65, 68, 86, 92, 93, 95, 96, 101, 102, 104, 113, 117, 128 and 131,) received from Almora, are the parts of some extracts of some Tāntrika works, containing some short address or prayers to Shākya, to Vajra Pani, and to other Saints or Divinities for instruction how to obtain prosperity and future beatitude, and how to be delivered from miseries of the present and of the future life. There are likewise many Mantras or mystical formulæ used in addresses for obtaining the favour of any particular Divinity: also, when presenting some offerings, &c. All such Mantras are in Sanscrit, but written in Tibetan character. There are in the Asiatic Society's Library many works on similar subjects."

The Secretary submitted for the inspection of the Meeting, facsimile Inscriptions, sent down by Lieutenant A. Cunningham, reporting at the same time, that having had these Inscriptions translated, they do not possess any thing of interest or novelty to require any further specific notice.

With reference to Dr. Forbes' communication on the discovery of a complete copy of the *Jami ul Tawarikh*, printed in the 107th Number of the Journal of the Asiatic Society, the following communication was read from H. M. Elliot, Esq., of Allahabad, of 20th September:—

"Not having yet observed any notice of *RUSHEED-OO-DEEN's* book at your periodical Meetings, I think it proper to bring to your notice a circumstance which came to my knowledge about two months ago, and which I should have mentioned earlier, had I thought it would have escaped observation so long. An anonymous work on History, bearing the same titles of chapters as *RUSHEED-OO-DEEN's* was brought by (the late) Sir JOHN MALCOLM from Persia, and presented to the College at Fort William, of which your Society has the Library. The work was copied at (I think) Casbin in 2616, and bears the title of *Jami-oo-Tuwareekh Judeem*, but without name of the author. This information I obtained one day from Stewart's Catalogue of Tippoo Sultan's Library, and I now communicate it, after this long delay, in the hope that a little search in your own archives will reward you with the discovery of this valuable work."

A search having been made as suggested by Mr. ELLIOT for the book, the Secretary had the satisfaction to report to the Meeting, that it was found, and the volume submitted to inspection.

The presentation by Moulvee Abdool Ruheem of a copy of the translation by him in Persian of the *Kamoos* was acknowledged by the Society by a vote of thanks, and the presentation in return to the Moulvee of all the Arabic works printed by the Society.

The Secretary submitted to the inspection of the Committee a folio containing Sketches by Lieutenant Colonel Salter, of the (late) 2d Regiment Light Cavalry, taken by him during his service in Afghanistan.

For these presentations and contributions, the thanks of the Society were accorded.

Proceedings of the Asiatic Society.

(Friday Evening, 3rd December, 1841.)

The Hon'ble Sir EDWARD RYAN in the Chair.

The Reverend WM. WINCHESTER, Chaplain at Berhampore, proposed at the Meeting of the 11th November last, was ballotted for and duly elected.

Ordered, that the usual communication of his election be made to the Reverend W. WINCHESTER, and that he be furnished with a copy of the rules of the Society for his guidance.

Library.

Books received for the Library of the Asiatic Society for the Meeting of the 3d December, 1841.

The Annals and Magazine of Natural History, vol. 7, Nos. 45 and 46, July and August, 1841,	No. of Copies.	2
Edinburgh New Philosophical Journal, by Professor JAMESON, No. 61, April to July, 1841,		1
Calcutta Christian Observer, December, 1841, new series, vol. 2d, No. 24, ..		1
Bulletin de la Société de Géographie, 2d series, tome 14, ..		1
Journal des Savans for April, 1841, Paris,		1
Letter addressed to the Government of Bombay by the Chamber of Commerce at the Presidency, 1841,		1
Liber As—Sojuti de nominibus relativis, Lugduni, Bat, 1840,		1

Read letter from the Secretary to the General Committee of Public Instruction of 26th November last, forwarding such Oriental books mentioned in the following list, as can be spared from the Library of the Education Committee :—

List of the Oriental Books, forwarded for the Library of the Asiatic Society.

SANSKRIT WORKS.

Vikramorvosi,	No. of Copies.	1
Uttaramchuritra,		1
Mudra Rakshaha,		1
Mugdhabodha, ..		1
Bhatti Kavya, 2 vols.		1
Raghu Vansa, ..		1
Sahitya Durpon,		1
Kavya Prokasa,		1
Bhasa Parichhed,		1
Mricha Kati, ..		1
Munu Sanghita, 2 vols.		1
Viavusta Ratnamalah, ..		1
Duttuck Chundrica and Mimansa,		1
Law of Inheritance,		1
Subhabilahs,		1
Principles of Chemistry, E. B., ..		1

Wilson's Dictionary,....	....	....	....	....	....	....	1
Bebaud Chentamony, ..	....	....	....	....	....	....	1
Malatee Madhava, ....	....	....	....	....	....	....	1
Retnavoli, ....	....	....	....	....	....	....	1
Khetro Tutto Depica, ..	....	....	....	....	....	....	1

PERSIAN AND ARABIC WORKS.

Kyfayah, 4 vols. ....	....	....	....	....	....	....	1
Suddedee, ....	....	....	....	....	....	....	1
Fussoli Abqrat, ....	....	....	....	....	....	....	1
Mill's Bridge's Algebra, ....	....	....	....	....	....	....	1
Shanamah, ....	....	....	....	....	....	....	1
Mujumah Sumshi, ....	....	....	....	....	....	....	1
Æsop's Fables,..	....	....	....	....	....	....	1
Syer Mutakherin, ....	....	....	....	....	....	....	1

Total No. of Copies, 29

Read letter dated Simla, 16th November 1841, from Capt. J. T. BOILEAU of the Engineers, forwarding an account of the Meteors which appeared there on the night of the 12th idem, in sufficient quantities to establish the fact of their excess over ordinary occurrences of the kind.

Read a 4th Memoir on the Law of Storms in India, being remarks and documents relative to the loss of the ship *Golconda* in the Tyfoons of 22d to 24th September 1840, in the China Sea, by H. PIDDINGTON, Esq.

Read remarks by Capt. J. T. Boileau, Bengal Engineers, on the Construction of Newman's improved Portable Barometer, and on the mode of renewing the Guage Point when lost, with a drawing.

The Secretary also submitted to the inspection of the meeting, a Perpetual Moon Table by Capt. R. SHORTREDE, who on a former occasion favored him with a Perpetual Time Table.

The foregoing Papers and Table, the Secretary noticed, would appear in early numbers of his Journal.

Read the following Report of the Curator for the month of November last:—

SIR,

During the brief period that has elapsed since the occasion of our last Meeting, but little has transpired that can be embodied in my present Report. Due progress has been made in determining and labelling the collection of Birds, which I trust will be entirely accomplished by our next Meeting. I have also commenced arranging the Insects, and shall soon have ascertained and labelled the order *Lepidoptera*, to the extent of my present means of determining the genera and species: The donations received for the Museum consist solely of Zoological specimens: viz. 1st, a Bat from Dr. Cantor, being the third species of Indian *Taphozous* now in the collection, whereas I believe but one has hitherto been described from this part of the

world; 2dly, a skull of a species of *Lutra*,* and the lower jaw of a *Delphinus* (species undetermined, and where taken I was unable to learn, though it was believed somewhere on the high seas, and not in the vicinity of India), from Mr. C. Harvey; 3dly, 4 species of recent Birds, from W. Frith, Esq., of which three are new to the Museum; and 4thly, a fine recent *Crocodilus biporcatus*, 9½ feet long, shot and presented to the Society, at the suggestion of J. M. Seppings, Esq., by the Superintendent Engineer at the Government Steam Yard, — Jones, Esq.

The following Birds have mostly been shot by myself; a few have been purchased, and those presented by Mr. Frith to the Society are included:—

Palæornis torquatus, female.

Falco tinnunculus, do. in first plumage.

Elanus melanopterus, do. do.

Halæetus Pondicerianus, do.

Vultur leucoceros, preparing as a skeleton.

Otus brachyotus.

Coracias Indica, two male specimens, in a phase of plumage which warrants the suspicion that *C. Assamensis* (McClelland and Horsfield), of which we possess a specimen noticed in my last Report, entirely according with the description, is a variety merely of the common Indian Roller.

Merops Indicus, male and female.

Alcedo Bengalensis, male and female.

Dendrocitta vagabunda, male and female.

Pastor tristis, male and female.

P. cristatellus, male.

P. cinereus ferdoia, male and female.

P. fuscus, (?) Wagler; *P. Mahrattensis*, Sykes.

Sturnus contra, male.

Alauda, species undetermined, and apparently undescribed.

Dicrurus balicassius, sexes in different states of plumage.

Chloropsis Malabaricus, male in immature dress.

Geocichla rubecula, male.

Calliope Lathamii, female.

Muscicapa carulea, male.

Jora tiphia, ditto.

Anthus rufescens (?), ditto.

Motacilla alba (vera), two very different males and a female.

Pyrrhuloxia crucigera, male.

Columba tigrina, male.

Ardea Malaccensis, male and female, immature plumage.

A. Javanica, Horsfield; *A. scapularis*, Wagler, young female.

Sterna, species undetermined, female.

Tadorna Bellonii,† male.

* I have since procured a recent animal of this genus, to all appearance the *L. vulgaris*, and the skull of which entirely accords with that above noticed.—*Cur. As. Soc.*

† In the Proceedings of the Zoological Society's for 1834, p. 50, Mr. Gould notices a specimen of the common Sheldrake from Trebizond, and remarks that it had not previously been observed

Pelicanus rufescens (?), Gmelin, * female.

Of these, the *Otus*, *Pastor pagodorum* and *P. fuscus*, *Alauda*, *Motacilla*, *Pyrrhula*, *Tadorna*, and *Pelicanus*, (seven species,) are new to the collection; and the remainder have replaced old and very inferiorly mounted specimens, and in several instances have added the other sex, in a different state of plumage to what was previously in the Museum.

The only other *Vertebrata* procured, consist of a Squirrel (*Sciurus palmarum*), a fine specimen of the Dhamna Snake (*Caluber Dhamna*, Cantor), and the Crocodile before mentioned, which is in process of being set up, while its skeleton is also preparing, and several of the viscera have been preserved in spirits.

A number of Insects have also been collected in the neighbourhood; and several of the Bird Skins from Tenasserim and the Himalaya, noticed in my Report for last month, have been mounted. The present being the only season at which fresh specimens of animals will bear to be brought from any distance in available condition, I continue to spare no pains to induce the Shikarees and others to supply us with as many species as they can procure; the duplicates of many are valuable for purposes of exchange and transmission to other Museums, and while the examination of such enables me to gain a more thorough knowledge of their various kinds, a rectification of many synonyms will doubtless accrue from the intercourse which it is thus sought to establish with Museums in different countries, and which it is to be regretted is not more general and extensive than at present.

I am, Sir,

Yours obediently,

EDWARD BLYTH.

December 3rd, 1841.

Read letter from Mr. Secretary BUSHBY, of the 10th November last, transmitting copies of Registers of the rise and fall of the Tide at Prince of Wales' Island and Singapore, for the months of April, May, and June, 1841, together with transcript of a memorandum which accompanied the Registers.

Ordered—That the thanks of the Society be conveyed to the Government for the Registers in question.

For the Presentations and Contributions, the thanks of the Society were accorded.

out of Europe. Mons. Temminck, however, had already enumerated this species in his list of European birds met with in Japan, and it was obtained by the late Sir A. Burnes on the Indus. Here it would appear to be very rare, being quite unknown to our taxidermists.

* This agrees tolerably well with the description in Shaw's Zoology, (vol. XIII, pt. I, p. 114,) except that the feet are there stated to be yellow, whereas in our bird they were of a leaden black colour, slightly tinged with green, and the claws white.

JOURNAL

OF THE

ASIATIC SOCIETY.

Report to the Secretary of the Board of Customs, Salt and Opium, on the Salts, called PUCKWAH and PHOOL-KHAREE; with a process for detecting the adulteration of Government Salt; estimates of the quantities of both Salts annually produced, and of the amount of loss which the Revenue may sustain through the production of these two articles. By HENRY PIDDINGTON, Esq.

As requested, I have now the honor to submit my report on the samples of PUCKWAH and PHOOL-KAREE Salts which I have examined, together with such considerations as have occurred to me in the course of the investigation.

From what I have learnt of the points desirable to be ascertained, and for more convenient reference, I have divided my report as follows:—

- I. Constituents of the two Salts.
- II. Means of detecting the adulteration of Government Salt.
- III. Chemical demonstration of the certainty of this method.
- IV. Estimate of the quantity of PUCKWAH produced annually.
- V. Estimate of the quantity of PUCKWAH, or edible Salt, annually produced in the preparation of the KHAREE, and of the quantity of KHAREE annually produced.
- VI. Estimate of the loss to the Revenue by the PUCKWAH and PHOOL-KHAREE.
- VII. Concluding remarks.

I.—*Constituents of the Salts.*

The PUCKWAH is mostly produced during the manufacture of Salt-petre, and sold openly in the bazars for culinary purposes. The PHOOL-KHAREE is manufactured from the efflorescence on the surface of various earths, and sold, as well as other inferior sorts of Kharee, ostensibly for feeding cattle and manufacturing processes,* such as curing hides and the like: the former sort, or PHOOL-KHAREE, really for the purpose of adulterating Government Salt. I mention these few facts preliminarily, though well known to you, as I shall have occasion to recur to them again.

Puckwah.

The effects of reagents on the solution are as follows:—

Tests.	Shewing	
	Acids.	Bases.
Muriatic acid, ...	... No Carbonates,	_____
Nitrate Silver, ...	... Muriatic, (abundant,)	_____
Acetate Barytes, ..	... Sulphuric,	_____
Gold Leaf, ...	... Nitric, (trace,)	_____
N. M. Platina, ...	... ..	... No Potass
Oxal. Ammonia, ...	... ..	... Lime, (trace,)
Phosphate Soda & Ammonia,	... ..	... Magnesia.

Its constituents were found to be in 100 parts, taken in its usual state,

Insoluble matter, ...	... ..	1.20
Extraneous Salts soluble in Alcohol, principally	Muriates	
of Magnesia and Lime, ...	.. ..	15.35
Sulphate Soda, dry, ...	... ..	2.45
Muriate Soda, ...	... ..	75.00
Traces Nitrates, Lime, Soda, and Magnesia,...	... ..	0.50
Hygrometric water and loss, ...	... ..	5.50
		<hr/> 100.00

The essential parts of this, for revenue purposes are, in briefer terms, that the Puckwah contains 75 per cent. of culinary salt, and that

* Report to the Board, says, there are three sorts, "PHOOL-KHAREE," or refined KHAREE; "BHE'r-KHAREE," or sheep's KHAREE; and "CHOOMAR-KHAREE," or CURRIER'S-KHAREE.

its bitter taste is owing to the Muriates of Magnesia and Lime and the Sulphate of Soda.

Phool-Kharee.

Tests.	Shewing	
	Acids.	Bases.
Muriatic Acid,	No Carbonates,	_____
Nitrate Silver,	Muriatic,	_____
Acetate Barytes,	Sulphuric,	_____
Gold Leaf,	No Nitric,	_____
N. M. Platina, ... ..	... ..	... No potass,
Oxal. Ammonia, ... ..	... ..	... Trace Lime,
Phosphate Soda and Ammonia, ... ..	... ..	... Do. Magnesia,

100 parts of the Salt in its usual state contain,

Insoluble matters, ... ..	... ..	... ..	1.20
Soluble in Alcohol Muriates, ... ..	... ..	... ..	0.75
Lime and Magnesia,... ..	... ..	... ..	Trace.
Muriate Soda, ... ..	... ..	... ..	2.45
Sulphate Soda, (dry), ... ..	... ..	... ..	80.00
Hygrometric water, .. ..	... ..	... ..	7.50
Water of crystallisation* and loss, ... ..	... ..	... ..	8.10

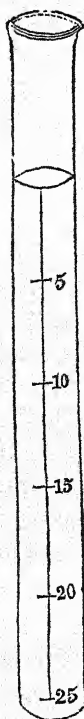
100.0

Here, as before, the essential part of the analysis for Revenue purposes, is, that the Salt is really one containing about 80 per cent. of dry Sulphate of Soda, or dry Glauber's Salt.

II.—*Means of detecting the adulteration of Government Salt by the Phool-Kharee.*

The prompt, certain, and easy method of detecting this adulteration is the following one:—I set down here the mere rules, such as Native officers would, with a little teaching, quickly understand; the chemical demonstration of them will follow in the next section.

* A small part of the sulphate of soda is in the state of crystallised salt, which contains 56 per cent. of water. The greater part of it, however, is in the anhydrous state.



The following is the necessary apparatus, all of which can be made or procured in the bazar :—

1. A glass tube about 0.5 inches in diameter, and 10 inches high, as in the marginal sketch. It is graduated to 25 divisions, on the principle shewn in the next section.
2. A common precipitating glass, containing about a quarter of a pint.
3. A pair of common medicine scales, with a single brass weight of 100 grains.
4. A bottle of solution of Acetate of Barytes, of the strength shewn in the next section.
5. A few straws, or a bone or ivory rod, for stirring the solution of the suspected salt.

To detect an adulteration.

A. Weigh 100 grains of any suspected Salt, and put it into the precipitating glass, fill the glass two-thirds full of clear water, and stir the salt till all has dissolved. A few grains will perhaps remain at the bottom, but these, which are sand and sulphate of lime, are of no consequence. Let the whole settle for a few minutes.

B. Fill your test tube from the bottle of Acetate of Barytes *exactly* to the upper mark.

C. Drop now, carefully, the liquid from your test tube into the solution of the salt. If there is any adulteration a heavy white cloud will be seen rolling quickly to the bottom. You must continue to drop in the solution till there is no more of this cloud; taking care that you allow it to settle from time to time, and not to put in *too much* of the test, particularly at the latter end of the operation.

D. The quantity of solution you have used, will be seen by looking at the tube. If it is 10, or 12, or 15, this is an adulteration of so much Kharee per cent. in your sample; and if it exceeds*—per cent. the Salt *must* have been purposely and illegally mixed with Kharee.

* This blank will be of course better filled up by you. It would be proper to make a set of trials with various Government salts before definitively settling it. It will never I think exceed 4 per cent., or at most 5.

E. Unless you want to know *exactly* the total amount of adulteration, which is rarely the case, you need only first drop in, say the 5 per cent. allowed by the Board, and after that 5 or 10 more. If it shews this, it is quite adulteration enough to prove that the salt has been purposely falsified, and there is no use in wasting your time and test liquor farther.

III.—*Chemical demonstration of the certainty of this method.*

1. It has been shewn that there are no Carbonates in the Kharee; and the proportion of Sulphate of Magnesia is so small in good salt,* that for practical purposes, it may be neglected or allowed for. The Sulphate of Lime may also for practice be considered as wholly insoluble in cold water.

2. We have thus only to deal with the fraudulent admixture of the anhydrous Sulphate of Soda, and perhaps at times with a little Sulphate of Potass. The problem is therefore, really, reduced to the simple one of ascertaining the quantity of Sulphuric Acid in a given quantity of salt. We may always assume that the base is Soda. The working fact for revenue purposes is, that *no* Sulphuric Acid [which in saline compounds form the Sulphates] *can* be present in good salt beyond the per centage which we allow at page 942 without having been put there for fraudulent ends; and in the state of Sulphate of Soda, *because* there is no other Sulphate available for so doing in the country.

3. We may take our specimen, containing 80 per cent. of the dry Sulphate of Soda, to be the strongest average salt used for adulteration. If a weaker sort, that is a Kharee containing more extraneous salts be used, more of it will be put into the parcel of salt to be adulterated.

4. If we take 100 parts of good salt to be adulterated with 25 per cent. of Kharee, it is clear that in this quantity there is $\frac{1}{4}$ of the 80 parts [or 20 parts] of the dry Sulphate of Soda which our analysis shews; the remaining 5 parts being made up by the extraneous salts.

* It is only 0.45 in bazar salt by Dr. McClelland's recent paper. By my analysis of Madras salt and Cuttack Pungah salt made several years ago, it was 2.04 for the first, and 5.45 for the last, the mean of these would be 3.7 per cent. Mine was I think very fresh salt, taken from the heaps. As before noted, trials should be made before fixing a standard allowance.

These 20 parts of dry Sulphate of Soda contain 11.20 of Sulphuric Acid, which require 37.50 parts of Acetate of Barytes to precipitate them.

5. Now our solution of Acetate of Barytes is made by dissolving 100 grains of the salt in 1000 grains of pure water,* and the tube filled to the mark, containing exactly as much of the solution as is equal to 37.50 parts of Acetate of Barytes, the whole of its contents will thus precipitate the 20 parts of dry Sulphate of Soda, which the adulteration of 25 per cent. contains.

6. And, as it is marked with 25 divisions, each division will shew one per cent. of such an adulteration. As before remarked, a weaker Kharee would allow more adulteration, but as it would shew always a nearly equal quantity of the Sulphate, this may be taken for a standard. I do not believe that a much stronger Kharee could be prepared. Could it be so prepared as to contain 90 per cent. of the Sulphate, this would only make a difference of $2\frac{1}{2}$ on the scale in the whole per centage, and for practice nothing beyond proof of, say 10 per cent. of the Sulphate of Soda, is really wanted to be known.†

7. If we like to take our scale as representing the exact quantity of Sulphuric Acid (which will then be an *exact* index to the quantity of Sulphate of Soda) we must remember that the 37.50 parts of Acetate of Barytes contained in the tube, are divided by the graduation into 25 parts; and as this quantity of Acetate of Barytes is equivalent to [or will precipitate] 11.20 of Sulphuric Acid, we have thus 25 divisions for 11.20 of Sulphuric Acid. Every five divisions will then represent 2.24 [or $2\frac{1}{4}$] of Sulphuric Acid, so that we may say in practice, that every $2\frac{1}{2}$ divisions of the scale will shew about $1\frac{1}{8}$ th part of Sulphuric Acid, or nearly two of Sulphate of Soda: every five divisions representing exactly four parts of the pure Sulphate of Soda; and five of the adulteration, because of the extraneous salt and water.

* This solution, at the temperature of 84° is of sp. grav. 1.36, and the Acetate is preferred, because of its cheapness and facility of making it, and because if Muriates or Nitrates are to be sought for, it is not in the way. The Muriate or Nitrate of Barytes may of course be used if desirable, the tubes being graduated accordingly.

† Here, as before, I need not remark, that a set of careful trials should be made with the Phool-Kharee of various parts to fix a standard. This can only be properly done in the district.

IV.—*Estimate of the quantity of Puckwah produced annually.*

The Report to the Board estimates the annual produce of Puckwah at $1\frac{1}{4}$ lac of maunds. I presume this is a mere conjectural estimate, at least I have not learnt on what it is founded. The following data and estimate appear to me to have good chemical foundation.

1. Mr. Stephenson [Treatise on the manufacture of Saltpetre, and papers in Journal of Asiatic Society] says, that the average of Muriate Soda obtained by him from 20,000 maunds of *Dooah** or crude Saltpetre from Loll Gunge in Tirhoot at the Company's factories, which he superintended, were as follows :—

Average per cent. of Muriate of Soda from good <i>Dooah</i> ,	... 4.2
From <i>Dooah</i> of native factories,	... .. 3.7
	<hr/> 7.9

Mean,... .. 3.95

and that only about 35 per cent. of this *Dooah* is Saltpetre. Hence we shall not, I think, exaggerate, if we say according to his results, (Pamphlet, page 47,) that in the average of factories, 2 maunds of *Dooah* (35 per cent. would require nearly 3 maunds) go to the production of one of Saltpetre. In round numbers we may also say, that as the average of good *Dooah* gives about 4 per cent. of Muriate of Soda,† there will be about 8 per cent. of it produced for every maund of good Saltpetre. But then, as we have seen by our analysis, there are but $\frac{3}{4}$ (75 per cent.) of *pure* Muriate of Soda in Puckwah, we must add the other fourth, or 2 per cent. to our 8 per cent. of Muriate of Soda to make it Puckwah. This gives 10 per cent. of Puckwah for 100 maunds of good merchantable Saltpetre.

2. But the preparation of the *Dooah* itself produces a large proportion of Puckwah, as I shall now shew.

3. Dr. Buchanan distinctly says, (Martin's Buchanan, vol. i. Behar, p. 363 and 364,) when describing the manufacture of *Dooah*, that he is assured that *as much* Muriate of Soda as Nitre is obtained by the workmen, and he gives at p. 364 and 365, the details of the manu-

* *Dooah* is in fact the first washings from the Saltpetre heaps or earths, boiled down and sold to refiners of Saltpetre, Natives or Europeans, who make it into marketable Saltpetre: all Saltpetre works must first produce *Dooah*.

† He speaks of some containing 8 per cent.

facture for making and refining the Nitre, with the products of it and of the Culinary Salt, 14 maunds of Saltpetre and 14 maunds of Puckwah. We shall afterwards see this singularly confirmed.

4. He again, in vol. ii. p. 280, when speaking of the manufacture of the Company's Nitre in Bhaugulpore, says, that "there is a concealed source of profit to the contractors," which he promises afterwards to mention, but he has not done so, or Mr. Martin's mutilated edition omits it. No doubt this is the production and sale of Puckwah; for,

5. In vol. iii. p. 332, (Puraniya,) he says, that when the Company's advances for Nitre were withdrawn, their monopoly rendering the private manufacturing of it illegal, the Beldars, 'Salt-makers,' betook themselves to the manufacture of Culinary Salt "from a saline earth found in many parts of the district." A small per centage would not have repaid them, and it is clear that it was no new trade to them as Saltpetre-makers.

6. Again, at p. 334, he says, that a Native agent of the Company assured him, and that some of the Beldars confessed, that they made *Beldari Nemuck*, (the same as the Puckwah,) from a thick brine called *Jarathi*, which subsides in making of their (crude) Saltpetre, which last is of course the same as the *Dooah*.

7. At p. 337, he relates the process for making the *Beldari Nemuck*, which is in fact *Puckwah*.

8. Dr. Buchanan, however, was evidently no chemist, and of questions like these only a chemist can understand the true bearings. Mr. Stephenson, who was a manufacturing chemist, and sent out by the Hon'ble Company, has left us still the best data. He says, p. 8, that he collected the saline soils from various part of Tirhoot to make an average; and he found by analysis that the Nitrates* formed 1.6 per cent. while the Muriate of Soda formed 1.4 per cent. Here we have a direct proof, though from another zillah, that Dr. Buchanan's apparently exaggerated statement, [p. 7,] that *as much* Culinary Salt as Saltpetre is made, may, in some parts at least, be no exaggeration!

9. Mr. Stephenson again shews us, by direct experiment, (Pamphlet, p. 84,) that in the making of *Cootiah* Saltpetre, or Saltpetre made from the earths preserved in factories, which is far richer in Nitre than that

* Of Potass and Lime, the first is Saltpetre, and the last becomes so as soon as it meets with potass, from ashes or vegetable remains, in the Saltpetre heaps.

produced in waste places, or on old walls, &c. the proportion of Puckwah to fine Saltpetre was 1 maund 16 seers to 14 maunds, or exactly 10 per cent. The proportion in earths collected as the *Nooneas*, (native Saltpetre-makers,) find them, was 7 seers of Puckwah to 22 of Saltpetre, or about 30 per cent. from the mother liquor only, after the making of the Saltpetre. From the whole result [p. 86] the proportion of Puckwah to Saltpetre was 17 seers to 55 seers, or about 33 per cent.*

10. I have not been able to meet with Dr. John Davy's experiments on the factory earths, or with Tennant's work,—if he had any thing on the subject? To Colebrooke I shall refer subsequently.

11. Resuming all these, we find, I think, that there is evidence enough to shew, that if *as much* Puckwah as Saltpetre be not produced, there must at any rate be a large per centage, and I think it cannot be below 30 per cent. for we find that Mr. Stephenson, doing his best, and under the most favorable circumstances—he did not want to produce Puckwah but Saltpetre—could not avoid obtaining 10 per cent. from factory earth of the best quality for Nitre, and 30 per cent. from others. Taking it, however, at only 25 per cent. in all the earths, of which as we have seen [page 7] 10 per cent. *certainly* exists, for it goes with the *Dooah* Saltpetre when sold to the refiner; we have still altogether 25 per cent. of Culinary Salt produced for every maund of good Saltpetre. I shall notice subsequently other sources of it.

12. We must now endeavour to ascertain the total amount of good Saltpetre manufactured in Bengal.

13. The total export of Culmee Saltpetre from Calcutta in 1840, was 4,86,000 maunds, and it has in recent years been as high as 5,14,000 maunds; for the sake of round numbers we may call the exports I think, 5,00,000 maunds.

14. We have next to estimate the internal consumption of Saltpetre for nearly all India, for it can but in few places be made so cheap as in Bengal.

* Again in Journal Asiatic Society, vol. ii. p. 23, he says, that an analysis from several hundred maunds of Native *Dooah* gave 8 per cent. Culinary Salt, (Muriate,) &c. to 77 Nitre. The proportion 8 to 77 is about 19½ per cent. How much had been already extracted from it?

15. I find as a datum [the only one I can obtain,] that, by the return you have obliged me with, the mean importation of Saltpetre into Calcutta, before the abolition of the transit duties, from 1831 to 1835, or four years, was

Factory maunds,	...	...	...	...	4,51,446
But as we know how smuggling flourished in those days, even within the Custom House itself, we may I think fairly call the real imports bazar—instead of factory maunds.					
Say then, imports, bazar maunds,	...	...	...	...	4,51,446
Average exports for the same period, from Custom House tables given by Stephenson, are bazar maunds,					
	...				4,25,683

The apparent consumption of Saltpetre for Calcutta, is
 thus bazar maunds, 25,763
 Throwing away the odd hundreds, let us say 25,000 maunds for Calcutta, and this for such a circle of it and its environs as would include a population of a million. If our Bengal Saltpetre grounds and factories supply only as much of all India as includes a population of 50 millions, we have then 25,000 maunds to multiply by 50, or 12,50,000 maunds for the consumption of 50 millions of inhabitants; reducing this again to less than one-half, because of the more quiet habits of country villages, we may still say, that the home consumption equals the export; or that we have 5,00,000 bazar maunds, produced somewhere, for that purpose also.

14. This appears startling, but when we recollect the almost perpetual volleys of fireworks, small arms and cannons, which are kept up, in one place or other, all over the country, and every day in the year, and often night and day, and that all gunpowder contains 75 per cent. of Saltpetre, we shall not be so much surprised. Here is another calculation bearing upon this matter.

Buchanan in his statistical table states that, for Patna City and Zillah Behar, there are

Atusbaz, or firework-makers,	...	...	..	...	118
For the district of Bhaugulpore the same artificers,	...				44
<hr/>					
Total,	...	..	...	...	162

Population (according to him) of Patna and Behar,...	33,64,420
Bhagulpore,	20,19,900
Total,	<u>5,384,320</u>

In Rungpore he speaks of the gunpowder-makers, but not of the Atusbaz. I do not know if he means the same thing, and it is not unlikely in small places, that the two trades are exercised by the same person. In Calcutta I find they are sometimes mixed and sometimes separate. We must also recollect that, in India, great numbers of individuals as often make their own gunpowder as buy it. I leave then the mere gunpowder-makers out of the question, and look only at the fire-work-makers.

If we take the 162 artizans in this trade, to find employment each for 3 workmen at 5 Rupees, and the master to make 7 Rupees per month we have per month, *Rupees* 22

For 162 artists, this is per month, of profits,* 3,564
 or 12 per annum profits, 42,768

If we take the *profits* to be 10 per cent. on the capital employed, this will be capital employed 4,27,680

If we take about three-fourths of this to be in Saltpetre, we may say for Saltpetre, 3,00,000

At 6 Rs. per maund, this is, *Maunds* 50,000

Now 50,000 maunds of Saltpetre annually, for a population of 5,384,000 would give, for one of 50 millions, about 4,62,000 maunds of Saltpetre, which, when we take all the home-made gunpowder and other manufacturing demands into consideration, is not so far from our former calculation. Patna, Behar, and Bhaugulpore comprise, I may observe, all varieties of population, from a great and luxurious city to the wild Hill tribes; and thus offer the elements of a fair average. Like all Indian statistical questions, the elements are so uncertain, that they are really but mere approximate notions, and I should not have occupied your time with it, were it not that the question of "what is the internal consumption of Saltpetre," is really an important one in our estimate. If we say that the 5,00,000 maunds of Saltpetre are worth at 6 rupees, 30,00,000 Rs., this would still not give an expenditure of one pice each in fire works for 50 millions of population.

* Wages must be paid out of profits.

16. We must then in the absence of better data than the foregoing take

The exports, at bazar maunds,	...	...	...	5,00,000
The consumption at least,...	...	...	...	5,00,000

Total amount of *refined* Saltpetre produced, *Baz. Mds.* 10,00,000

And in the production of this, there appears good chemical ground for assuming, that at least 25 per cent.

of Puckwah are produced, which gives, from the Saltpetre

manufactory alone, Puckwah to the amount of, *Baz. Mds.* 2,50,000

17. We have next to consider, that we may at least look at all the sources of the article, the different notices of the *Salt* works which are to be met with in various authors. This Salt we may also call Puckwah. They will scarcely afford us data, but they should not be passed over in attempting to estimate the quantity of Puckwah thrown into the market.

18. Mr. Colebrooke, (Remarks on Husbandry and Commerce of Bengal,) says, page 181, of London edition, that in Oude and Benares, this process of washing earth and evaporating the solution, is followed to obtain *Culinary Salt* without extracting the Nitre, and he details the process, but without any figured statements, as a perfectly familiar one. The proportion of edible Salt must be considerable, and the places where it is found numerous, to render it so well known an operation. Dr. Buchanan, vol. i. p. 550, speaks of the *Salt works* from wells in Ramghur, Zillah Shahabad.* In vol. iii. Dr. Buchanan, as before quoted, says, that the Beldars of Puranya made *Culinary Salt* alone, and he describes it as a separate manufacture at p. 337 and 338, the produce selling at 4 rupees per maund. Mr. Stephenson (Journal Asiatic Society, vol. iii. p. 36,) has a valuable paper on the manufacture of Salt in the Ghazeepore district, shewing that the earth contains *half as much* Muriate of Soda as Sulphate of Soda, i. e. 1.5. Muriate to 2.7 Sulphate, and that the Salt contains 60 per cent. Muriate of Soda or edible Salt to 37 per cent. of the Sulphate. We have no data by which to ascertain the extent to which this edible Salt manufactory is carried; we must therefore allow it as a

* Mr. Stephenson found the water of wells in Tirhoot to be strongly impregnated with Muriate of Soda.

make-weight in our former estimates of Puckwah. It will be seen in the succeeding section, that we may assume a considerable portion of Puckwah to be also produced in the manufacture of the Kharee, and possibly some in the preparation of the *Reher* or Soda earths, for the use of the washermen, soap-boilers, glass-makers, &c. &c.

V.—*Estimate of the quantity of edible Salt produced in the manufacture of the Phool-Kharee, and of the quantity of Phool-Kharee annually made.*

1. The production of the Salts called the Kars, Karees, and Dhars, is a separate trade where earths are washed for these alone, and they are also produced in the preparation of Saltpetre; we may suppose them not always thrown away when they form so large a per centage as it will be seen they do.

2. Dr. Buchanan says, vol. i. p. 366, that he estimates the production of Dhar at 2 maunds of it to every 14 maunds of crude Nitre. This is $\frac{1}{7}$ th, or say $14\frac{1}{4}$ per cent. which as we allow 2 maunds of crude to make but one of refined Saltpetre, gives $28\frac{1}{2}$ per cent. upon every maund of this article.

3. Mr. Stephenson says, (p. 8), in his Analysis of the soil in Tirhoot, that it contains nearly as much of the Sulphate (Kharee) as of the Muriate and Nitrate together, but as we have before noticed (p. 8) the Culinary Salt obtained from these two sources, I only allude to them here. As a source of Kharee, they should be borne in mind. Mr. Stephenson says, 2.7 of Sulphate and 3.0 of Murates and Nitrates. In Mr. Stephenson's paper, (Journal Asiatic Society, vol. iii.) on the efflorescence of the Kharee, we find the best datum. He says there, that the efflorescence collected by him gave 58 per cent. Sulphate, (Karee), and 22 of Muriate of Soda; so that, using round numbers, every maund of Kharee from thence would give the workman *one-third* of a maund of Puckwah. This, however, may have been a richer spot than the average. Buchanan says, that some Muriate of Soda is also found with the efflorescence of Carbonate of Soda, (*Rehar* or *Sajee Mutti*); but his work has evidently been sadly

mutilated in this part, and we have no data* to guide us in a calculation. Perhaps instead of 33 per cent., or one-third of a maund of Muriate of Soda to one of Kharee, we might assume with full safety 20 per cent. from this source? The low price of the Kharee, the best the report says, selling for 12 annas per maund, is strong presumptive evidence, that it is not the only product derived from the manufacture.

5. As to the quantity of Kharee produced, the report estimates the total of Kharees at $2\frac{1}{2}$ lacs of maunds. If our estimate, above taken, be correct, we have here 50,000 maunds of Culinary Salt from the Kharee. We may, however, make some attempt to estimate the quantity of Kharee produced. Dr. Buchanan says, as quoted p. 13, $14\frac{1}{4}$ per cent. on the rough Saltpetre. Mr. Stephenson gives 23 per cent. in one case, and $17\frac{1}{2}$ per cent. in another, of the Sulphate, but these proportions must be doubled, because 2 maunds of *Dooah* go to make one of good Saltpetre, which would then give 46 and 39 per cent. The mean of these three; viz.

Buchanan,...	...	...	...	...	...	28 $\frac{1}{2}$ per cent.
Stephenson,	...	...	...	...	{	46 " "
						39 " "
						<hr/> 113 $\frac{1}{2}$ " "
					Is,	... 38 per cent.

If we only take this at 25 per cent., which is a larger deduction than the near approach of Dr. Buchanan's estimate, by weight of manufacturing produce, and Mr. Stephenson's by chemical assay, would warrant, we should then obtain, if our estimate of the production of Saltpetre (p. 12) be correct, 25 per cent. upon 10,00,000 maunds of Saltpetre, or 250,000 of Kharee from this source alone; and as this must be of the purer sort, we cannot perhaps go far wrong if we suppose that the work of those *Nooneahs*, who make Kharee only, supplies the consumption of the cattle and the curriers. This is vague enough, but we have no better data. The report says, about 80,000 maunds of each of the three sorts may be produced in all, which would allow only 80,000 of

* This is an important question for research. "Is any Muriate of Soda extracted from the Soda earths?" If so, this may be also a very considerable source of illicit Salt.

the Phool-Kharee to be used for adulteration. I should be much more inclined to rate it at the lowest at double this quantity, or nearer 2 lacs of maunds of the first sort. We have already estimated the amount of Puckwah made with the Saltpetre alone, and we see that the amount of Kharee made with it must be very large. In the European refining factories it *appears*, (for we do not know all the secrets of the trade,) that the extraneous Salts are mostly thrown back to the Saltpetre heaps; yet with the large deductions I have made, and Dr. Buchanan for our authority, that the Nitre-makers *do* sell it, we shall not perhaps at all events exceed in saying that, every thing considered, at least a lac of maunds of Phool-Kharee may be thrown into the market for adulteration, and 25,000 maunds of Puckwah be produced in the making of Kharees of all kinds?

VI.—*Estimate of the loss to the Revenue from the foregoing sources.*

					<i>Maunds.</i>
Puckwah from manufacture of Saltpetre,	...	...	...	...	2,50,000
From Phool-Kharees,	...	...	...	...	50,000
Phool-Kharee sold for adulterations,	...	...	...	...	1,00,000
Total maunds,	...	...	...	...	4,00,000

This being all sold as Government Salt, gives

Total value at 400 rupees per 100 maunds, Co.'s Rs. 16,00,000

Of which loss to Government at 300 rupees, is Co.'s Rs. 12,00,000

VII.—*Concluding Remarks.*

This amount of loss to the Revenue seems enormous, but we may notice

1. That the nature of the Salt is a chemical certainty.
2. That we can attach the highest confidence to Mr. Stephenson's results, because he had no motives to wilful misrepresentation any way, and might fully expect his results and statements would be closely examined in Calcutta, so that his professional character as a chemist was at stake. I add, that from personal knowledge of him as a working chemist, I feel quite satisfied, that they *are* entitled to full confidence.

3. That even now our knowledge is evidently very imperfect, and the probability is, when we recollect that since our possession of these provinces Mr. Stephenson seems to be the only practical chemist who understood what he saw about him, that there are many more things for a chemist to discover.

4. I have, it will be observed, indicated some sources which can only be taken into account as make-weights; what may be the aggregate amount of all these we know not. It may be much larger than we suspect.

Postscript.

Fortunately I had not seen the report of the officer deputed to enquire on this subject before handing mine to you; and indeed I had but a few minutes' conversation with him before entering on the investigation, and the results of this conversation I have stated in my report. I say "fortunately," because it is most satisfactory to me, as it must be to the Board, and to him, that in so intricate and uncertain an investigation, two reports founded, the one upon local inquiry, and the other upon chemical and statistical deductions from a mixture of certain and uncertain data, the main results should so closely approximate. To shew how nearly they do so, and where they differ, I set down briefly in parallel columns, our results, following the order of my sections, and add my remarks at the end of each, where required.

Section I.—Chemical constituents of the Salts.

PUCKWAH.

Report says "Par. 38. Is informed that good Puckwah contains 10 Nitre, 53 Culinary Salt, 21 Kharee, Sulphate of Soda, &c. 16 various Salts."	I shew, that the sample analysed contains 75 Culinary Salt, no Nitre, $2\frac{1}{4}$ Kharee, and 15 extra-neous Salts.
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"Par. 60, contains Nitre."

Note.—It is possible, and indeed most probable, that every sample differs, and in this the report agrees with me. But I should exceed-

ingly mistrust the information of any manufacturer, European or Native, on this subject, as see Par. 53, where it is said that the export of the Puckwah is kept secret as being illegal; see again p. 57. As there *must* be from 8 to 10 per cent. of water and insoluble matters in the Puckwah; this seems for a chemist a very rough note indeed. Next, what is meant by *good* Puckwah. Puckwah which sells well I suppose? for they could, I think, separate most of the 10 per cent. of Nitre and the Kharee with ease? I presume this mixture is that which best disguises the taste of the factitious Salt, or else that as mentioned farther, the factory servants had an interest in producing more Puckwah? Of the chemical constituents of the Kharee, the report says nothing.

Sections II. and III. have nothing in which we can compare, being wholly new.

Section IV.—Estimate of the quantity of Puckwah produced annually.

First from the Saltpetre manufacture in all its stages.

<p>Report, "Par. 38. Very little Puckwah produced in the <i>refining</i> of Saltpetre, but afterwards, Par. 47, 6 per cent. occurs even with European superintendence, and the actual produce of it should be therefore reckoned from the <i>Dooah</i>. Par. 43. European factories <i>have</i> 6 to 8 per cent. Puckwah on their produce of <i>refined</i> Saltpetre."</p>	<p>I deduce that the produce is to be really calculated from the <i>Dooah</i> and in <i>its</i> preparation. That on the whole, with every allowance and deduction, it will not be excessive to say, that, for every maund of refined Saltpetre in the market, 25 per cent. or 10 seers may be allowed as the average production of Puckwah in making it.</p>
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<p>"In a small factory Puckwah amounts to 10 per cent. on the refined Saltpetre."</p>	<p>Thence it would appear, that it really must at least reach to this amount.</p>
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"Par. 44. Four factories near Patna give 24, 30, 50, and 56 per cent. Puckwah!"

"Par. 45. *Nooneahs* allow that their produce amounts to about

25 per cent. on their crude Nitre,
[*Abee or Dooah.*"]

"Those of Behar and Shaha- That there are in various parts
bad may even obtain as much Salt Salt works, of which we have no
as Saltpetre." notice; but I allow their produce

"Par. 49. And in northern as a make-weight.
Tirhoot, the name of Saltpetre is but
a cloak for the making of Salt."

V.—*Puckwah produced with the Kharee, and the quantity of Kharee.*

Report says, "Par. 61. The I deduce that it certainly must
Phool-Kharee contains Puckwah." be produced with it, to the extent

"Par. 71. Puckwah made in N. of at least 25,000 maunds.
E. Tirhoot."

From Saltpetre and other data,
"Quantity 1,83,000 maunds, but 1,00,000 maunds Phool-Kharee
is now said to be [from the tax] will not be excessive, or 3 lacs of
3,23,680 maunds, and 50,000 in all sorts.

Sarun of all sorts—Total 3,73,680
maunds."

Section VI. and VII.—Little or nothing in common with the Report.

To conclude. The first object of my paper was to shew, that the
adulteration might not only in the hands of a chemist be *detected* by
very simple means, but that it might be *measured*. This measure-
ment I see removes another of the difficulties before the Board, which
is the detection of the adulteration of good Salt by Puckwah.

From the statement of the report to the Board, it seems that
Puckwah also contains 21 per cent. of Kharee or Sulphates. In this
case, the Puckwah is in fact but a mixture of Kharee and Puckwah;
but taking our sample as a very pure one, a really *good* Puckwah, we
see it contains $2\frac{1}{4}$ per cent. Kharee. Now, say the Government
allows for chance impurities 4 per cent. of Sulphate, we may fairly
take the medium between the 21 per cent. mentioned above, and our
very pure sort as an average sort. This will be about 10 per cent.
which is an amount distinct enough to be shewn to the clumsiest hand

by the use of the test, which thus becomes in all probability as good a one for the adulteration by Puckwah as for that practised by means of the Kharee.

Calcutta, 31st October, 1841.

Remarks by Captain J. T. BOILEAU, Bengal Engineers, F. R. S., F. R. H. S., on the construction of Newman's improved Portable Barometer, and on the mode of renewing the Gauge Point when lost; with a Drawing.

A recent modification has been made in the portable (or as it is more commonly called the mountain) Barometer, by Mr. Newman of Regent Street, London, whose standard Barometers have become so justly celebrated; and believing that a description of these instruments has not yet been published in India, I am induced to forward the accompanying sketch of their construction, and at the same time annex the result of some comparisons made with two of these portable instruments, and the Observatory standard, for the purpose of determining the gauge (or neutral) point of the latter, which had been lost in both by the escape of a considerable portion of mercury from their cisterns.

In the best portable Barometer of Troughton, Dollond, and Cary, the surface of the mercury in their cistern is brought by a simple mechanical contrivance to the level of a gauge point, (the Zero of the divided scale; by which the height of the column is read,) a measure of which if the gauge point were invariable, would do away with the necessity for a correction on account of the varying height of the mercury in the cistern, due to the rise and fall in the column.

The gauge point, or line, is not however invariable in either of the above constructions save Cary's; and Mr. Newman's object appears to have been to devise an instrument, which should be independent of the adjustment, preliminary and essential to each observation in those of the above kind, and whence the true height of the mercurial column should yet be deducible with as much accuracy, as if it had been read from the absolute Zero of the scale.

It is in the construction of its cistern that Newman's portable Barometer differs chiefly from others, and a description of this part, therefore, is all that is essential.

The cistern, (shewn in section in the figure) is of iron, and is divided into two chambers, A the superior, and B the inferior; communicating when in a given relative position with one another by a fine hole *o, o*, passing through the bottom of the upper, and top of the lower chamber, the bearing surfaces of which are ground mercury-tight together; the lower chamber has motion round the common axis of the cistern through an arc of about 90° , so that by turning it a small quantity only, the connection between the two chambers is cut off, the continuity of the small hole being broken. Into the upper chamber the glass tube is inserted in the usual manner by means of a thick box-wood cap, which is pierced also to admit the stem of a small Thermometer, having its bulb immersed in the mercury of the cistern. A brass cylindrical case in two parts covers the cistern, each part being attached to its corresponding chamber. A hollow mahogany tube is attached by screws to the upper part of the brass case, and a brass scale of about 14 inches in length screwed to the wooden tube registers by means of a vernier reading to the 500th part of an inch, (and by estimation to the 1000th part) the height of the mercurial column.

The instrument having only a partial scale, and this not being directly referable to the surface of the mercury in the cistern, it is evident that to establish a correct Zero or neutral point, the capillarity of the tube must have been accurately determined beforehand; this done, a comparison is made with a standard instrument, and a point marked on the brass scale, (which is as yet undivided,) gives, after allowing for the difference in the capillary action of the two tubes, the Zero reading, or neutral point, of the portable Barometer.

An example will better explain this operation, upon the accuracy of which the correctness of the instrument depends.

Let the capillarity of the tube of the standard Barometer be $+002$ inches, and that of the portable instrument $+037$ inches, then if at the time of the comparison for determining the neutral point of the latter instrument, the mercurial column of the standard stood at 25.362 inches the corresponding height for the portable Barometer would be

$$25.362 - (.037 - .002) = 25.327 \text{ inches,}$$

which would be the Zero, or neutral, reading at the temperature of comparison; to and from this point the other divisions of the scale (inches, tenths, and half-tenths,) would be set off.

The neutral point being thus determined, the true height of the column of mercury above the level of the surface in the cistern for any other reading is deduced in the following manner:—

Let $a \dots \dots b$ (see the section,) be the line of level corresponding to the neutral point, and suppose a fall to have taken place in the mercurial column, a proportional rise will take place in the level of the cistern, and the converse exactly for a rise in the column, which will be accompanied by a corresponding diminution in the level of the mercury below. The variations in height being inversely proportional to the areas of the occupied portion of the tube, and of the cistern; or, which is the same thing, inversely as the squares of their diameters, since, in Mr. Newman's portable instrument, both tube and cistern are cylindrical. If then, D represent the interior diameter of the cistern, and d, d' respectively the interior and exterior diameters of the tube, all expressed in terms of the same linear unit; also if, h represent the height of the column at the neutral reading, and h' any other observed reading, then the true height of the column H for that observed reading will be

$$H = h' \times (h' - h) \times \frac{d^2}{D^2 - d^2} + h$$
 at the temperature 1° —in which the upper sign is to be taken when the observed reading is greater, and the lower sign, when it is less than the neutral height. The factor $\frac{d^2}{D^2 - d^2}$ is constant for the same Barometer, and is what Mr. Newman calls, the *correction for capacity*—it is determined experimentally by the maker, and together with the neutral reading and temperature of comparison of the same, is stamped upon an ivory collar attached to the wooden case of each instrument.

It is much to be regretted, that the ingenuity and care displayed in the construction of the cistern of Newman's portable Barometer, (which is the same in principle as in his standard,) should be entirely thrown away by the exceedingly primitive and imperfect make of the other parts. For reduced, or indeed for good comparative observations, no Barometer is to be trusted, the scale of which is not divided on a brass or other metal rod extending the whole length of the instrument—but this, it has been seen, is not the case in that just described. There would be no difficulty, however, in fulfilling every desired requisite of the above nature in the construction of Newman's portable Baro-

meter, and thus improved, it would be found one of the most convenient, safe, and elegant instruments of its kind ever made, instead of being, as it now is, an almost useless toy.

In proof of this assertion, it is only necessary to mention, that both the portable Barometers brought out as a part of the equipment of the Simla Magnetic Observatory, were found to be quite unserviceable the very first time they were taken out for use; the mahogany tube was loose in the brass case of the cistern, and in one, (No. 44,) had warped, so as to have broken the Thermometer; in both, the boxwood cap, which attaches the glass tube to the cistern had shrunk, so that the mercury escaped in large quantities, and the neutral point being thus lost, the Barometer was of course, in its present state, useless for absolute measurements; but having no other instruments, it became an object of importance to repair, if possible, those in my possession, and to institute a gauge point or neutral reading for them by comparison with the standard in the Observatory, and I am induced to forward an account of the method in which this has been effected *pour encourager les autres*, who may be left to their own resources as I have been, not to set aside even an imperfect instrument without an effort to improve its condition: for the result of my own attempt has certainly proved as successful as, under the circumstances, could have been expected. It is of the first importance too, in the publication of altitudes determined by the Barometer, that the quality of the instrument employed should be known, and as the two portable Barometers in my possession will be used frequently for determining the relative heights of mountains by simultaneous comparisons with the standard in the fixed Observatory, the following details are the more necessary, as shewing what weight may be attached to the observations made with them.

The first thing necessary was to make the cistern perfectly mercury-tight, which has been completely effected by a stuffing of tow and glue round the boxwood cap, the cap having been filed to a level (inwards) sufficiently to allow of a wrapper of the above materials being applied and pressed down by an iron tool from above—next, the instrument being inverted, a hole (*ef*) bored in the lower chamber and a fine screw tapped into it; a supply of mercury was then introduced, and the cistern being screwed up, the instrument was set by to dry for some days, after which, the comparisons for determining the neutral reading were commenced.

The standard Barometer of the Observatory, with which the comparisons were made, is by Newman, the cistern measures 6 inches in height and three in diameter over all, and about $2\frac{1}{2}$ inches inside, the tube is 5.54 inches in diameter *inside*, and the scale and vernier are of platinum, the former being attached to a brass rod terminating below in a fine ivory point, which is adjusted to the surface of the mercury in the cistern—the scale reads by means of the vernier to the 500th, and by estimation to the 1000th part of an inch, to which limit all the observations are taken.

The following are the values given by Mr. Newman of correction for capacity, &c. of the two portable Barometers attached to this Observatory :—

No. 40—Correction for capacity,.....	$\frac{1}{42}$
For capillary action,	+·042
Temperature,	60° Faht.
No. 44—Correction for capacity,	$\frac{1}{55}$
For capillary action,	+·031
Temperature,	60° Faht.

The Thermometer of No. 44 is broken.

The comparisons were made in the following manner: the two portable instruments were hung up on the same pillar with, and one on each side of, the standard Barometer, and a small excess of mercury having been introduced into the cistern, the escape of a portion was allowed to take place by means of the screw below until the height of the column read approximately the same as the standard, making due allowance for the difference in the capillary action of the two tubes; a perfect coincidence was found impracticable.

The annexed table exhibits the mean daily results of the comparisons which were taken, every two hours at the times appointed for the other regular observations, and embrace therefore the period, nearly, of one complete oscillation; viz. from 10h. 29m. A. M. to 10h. 29m. P. M. inclusive, Observatory mean solar-time, so that each entry is the mean of seven observations, and the mean of the means for No. 40 is deduced from 133, and for No. 44 from 112 comparisons; the differences from the standard are as accordant as could have been expected, considering the imperfect nature of the scale upon which the heights are measured, the difficulty of getting a good contact with the surface

of the mercurial column, and that the daily means combine the errors or *personal equations* of the different observers. It is perhaps superfluous to mention, that the first comparative reading of each portable Barometer has been taken as a Zero, to which all the corrections for capacity have been made, and if the instrument could be read with precision, all the differences from the standard should have come out alike. The differences of the partial results from the final mean are, however, generally within the limits of the probable error of observation, and the latter may therefore be considered as correct an approximation as could, under the circumstances of the comparison, be obtained, and certainly sufficiently so to warrant the use of the instrument in the determination of altitudes, comparatively with the Observatory standard, to which, provided the cisterns remain mercury-tight, they will now be immediately applied. The results of those observations will be communicated hereafter.

Table of the mean daily comparisons of Portable Barometers, Nos. 40 and 44, with the Observatory standard, No. 40.

Days.	Standard.		Portable Barometer No. 40.						Portable Barometer No. 44.					
	Height of Column + .003.	Therm.	Height of Column + .042.	Therm.	Diff. from first reading.	Correction for capacity 1.42.	Corrected reading.	Diff. from standard.	Height of Column + .031.	Therm.	Diff. from first reading.	Correction for capacity 1.55.	Corrected reading.	Diff. from standard.
0	23.336	0	23.306	0	0	0	0	-.030	23.343	0	0	0	0	+.007
1	23.315	61.6	23.271	61.9	-.037	-.009	23.260	-.052	23.324	-.010	-.004	23.320	+.004	-.004
2	.357	62.	.316	62.1	+.010	+.002	.318	-.041	.365	+.022	+.004	.369	+.012	
3	.233	62.1	.259	62.3	-.017	-.004	.285	-.048	.335	-.068	-.002	.333	+.000	
4	.339	62.6	.300	63.0	-.006	-.001	.299	-.035	.346	+.003	+.001	.347	+.006	
5	.308	61.7	.272	62.0	-.034	-.008	.264	-.044	.316	-.027	-.005	.311	+.003	
6	.261	61.3	.250	61.5	-.086	-.027	.193	-.065	.264	-.079	-.014	.250	-.011	
7	.285	60.7	.232	61.3	-.074	-.018	.214	-.071	.288	-.054	-.010	.279	-.006	
8	.391	60.1	.348	60.5	+.042	+.010	.358	-.046	.396	+.053	+.010	.406	+.014	
9	.404	60.	.354	60.2	+.048	+.012	.366	-.028	.407	+.064	+.012	.419	+.015	
10	.386	59.7	.347	60.1	+.041	+.010	.357	-.029	.394	+.051	+.010	.404	+.018	
11	.386	58.9	.348	58.7	+.042	+.010	.358	-.029	.398	+.059	+.016	.408	+.022	
12	.429	57.3	.380	57.0	+.074	+.018	.398	-.031	.432	+.069	+.013	.448	+.019	
13	.399	56.9	.353	56.5	+.047	+.011	.364	-.035	.412	+.021	+.004	.368	+.014	
14	.364	57.3	.306	57.1	-.000	-.000	.306	-.048	.364	+.073	+.014	.432	+.024	
15	.408	58.	.362	57.7	+.056	+.013	.375	-.033	.418	+.051	+.010	.404	+.016	
16	.388	58.7	.335	58.2	+.029	+.007	.342	-.046	.394	+.026	+.004	.370	+.011	
17	.346	59.4	.296	59.1	-.010	-.002	.294	-.052						
18	.320	59.4	.280	59.3	-.026	-.006	.274	-.046						
19	.362	59.2	.318	59.3	+.012	+.003	.321	-.041						
mean	23.356	59.8	23.312	59.9	+.006	+.001	23.313	-.043	23.366	+.026	+.004	23.370	+.011	

Magnetic Observatory, Simlah, 5th Nov. 1841.

* This difference is taken from the mean of the standard for 16 days, viz. 23.359 inches.

It appears from the above, that the mean neutral reading for Portable Barometer, No. 40, viz. 23.313 is .043 of an inch too low, and in No. 44, the neutral reading 23.370 is .011 of an inch too high. The following Examples will explain the method of reducing the observed to the true readings for both instruments:—

Example for Barometer, No. 40.

Suppose the observed reading on the scale to be 22.543 inches, the temperature of the mercury being 49° Faht.—the true height of the column is required.

Observed reading,	$h' =$	22.543 inches.
Neutral do.	$h =$	23.313
Difference,	$(h' - h) =$	—0.770
Correction for capacity,	$\frac{1}{42} (h' - h) =$	—0.183
Observed reading as above,	$h' =$	22.543
True height of column,	$H = h' - \frac{1}{42} (h' - h) =$	22.360 inches.

Example for Barometer, No. 44.

Required the true height of the column of mercury, the observed reading on the scale being 25.291 inches and the temperature of the mercury, 64° Faht.

Observed reading,	$h' =$	25.291 inches
Neutral ditto,	$h =$	28.370
Difference,	$(h' - h) =$	+1.921
Correction for capacity,	$\frac{1}{55} (h' - h) =$	—.349
Observed reading as above,	$h' =$	25.291
True height of column,	$H = h' + \frac{1}{55} (h' - h) =$	25.640

A correction would also be required for temperature, but with instruments of this construction, *i. e.* as to relates to their scale, the reduction in this account is impracticable.

Observations of Meteors, on the night between the 12th and 13th November 1841, made at the Magnetic Observatory at Simla. Communicated by Captain J. T. BOILEAU, Engineers, F. R. S. &c. &c. Superintendent.

The observed recurrence of numerous meteors on the same night, during a series of years, having led to a belief in their periodicity; it has been become a special duty at all the fixed Magnetic Observatories to watch for their appearance, on the dates in question; the nights of the 10th August, and of the 12th November, have afforded the most remarkable instances of their recurrence, both as regards their number, and the regularity of the phenomenon. Our labours here, on the former night, were fruitless — not a single meteor having been visible; but the following account of those observed on the night between the 12th and 13th instant, confirms the fact, as regards the latter date. It is to be hoped, should similar observations of these meteors have been made in other parts of India, that an account of their appearance may be forwarded for publication, in the Journal of the Asiatic Society, *without delay.*

Night between the 12th and 13th November, 1841. By 3rd Assistant C. NUTTALL.

8: 15 P. M.—Brilliant meteors, to N. Motion moderate, direction from near the Pole-star perpendicularly downwards.

11: 10 P. M.—Meteor NE. by N. altitude 1st appearance 30°, direction downwards.

11: 15 P. M.—Meteor over head, direction downwards.

By 1st Assistant J. B. GRIENTHWAITE.

2: 55 A. M.—A few luminous patches appeared from E. to N.E. at an elevation of about 30°. At 3h. 02m. A. M. they became more brilliant, and light was apparently pulsating through them; at 3h. 08m. assuming a dull appearance, they disappeared.

3: 30 A. M.—Two dim meteors from Zenith downwards, direction N.E.

4: 25 A. M.—Five bright meteors passed rapidly from Zenith vertically downwards, N.E.

By 2d Assistant W. CRAIG.

On proceeding to the Observatory about 4: 25 A. M. perceived a shower of meteors, and after taking the regular observations, recorded meteors as follows; viz.

1. From Zenith downwards, S.
1. Ditto ditto S. altitude of first appearance, 50°.
1. Ditto ditto E. ditto ditto, 40°.
1. From E. nearly horizontal to S.E.
1. From N.E., direction E., altitude of 1st appearance, 50°.
1. From Zenith towards E.
1. From ditto, direction downwards to S.W.

The 2d Assistant observed in all about 30 meteors, chiefly in the above directions, but did not record them individually.

By Captain J. T. BOILEAU, Engineers, Superintendent, at Strawberry-Bank, about 800 yards E. of the Observatory.

- 4: 50 A. M.—1. From α Hydræ, S.S.E. vertically downwards.
- 4: 55 A. M.—1. Through Corvus ditto ditto.
- 5: 03 A. M.—1. Between γ and λ Argus, small, ditto.
- 5: 05 A. M.—1. Through middle of Auriga, N.E. to S.W.
- 5: 06 A. M.—1. From near α Leonis downwards E.
- 5: 08 A. M.—In Argus as above, vertically downwards.
- 5: 11 A. M.—1. From near Procyon S. vertically down.
- 5: 13 A. M.—1. Near γ Columbæ, S. downwards.
- 5: 25 A. M.—1. Very small from α Leonis towards S.E.
- 5: 26 A. M.—1. Between α and β Cassiopeæ downwards N.N.E.
- 5: 32 A. M.—1. Very rapid from Cancer through Gemini and past β Persei.
- 5: 41 A. M.—1. Very faint from near Sirius downwards W.S.W.
- 5: 45 A. M.—1. Faint downwards N.N.E. from between ξ and η Ursæ Majoris.

Day-light interrupted further observation, though faint lines were occasionally observed as of the passage of meteors, for sometime after the day had well dawned. The night was remarkably clear, free from clouds, and calm, and stars were particularly bright:—one meteor only was observed on the evening of the 13th November, and none had been seen for many nights before the 12th.

During the time of the luminous appearance observed in the N.E. mentioned above, the underwritten readings of the Declination Magnetometer, were taken. The scale readings of the instrument had been gradually increasing for nearly an hour previous to the phenomenon noted, and at the moment of its occurrence, a gradual decrease began to take place, and continued until the disappearance of the patches.

At 2:45 A. M. Scale reading of Declination Magnetometer, 156.

3:00	Ditto,	ditto,	155.9
3:15	Ditto,	ditto,	155.8
3:30	Ditto,	ditto,	155.4
3:45	Ditto,	ditto,	154.7
4:00	Ditto,	ditto,	154.2

The two latter readings being lower than any observed at these times of the day, during the month. The change of reading indicates a movement of the north end of the declination needle, West, through an arc, not taking the torsion of the suspension thread into account, of $1' : 13''$ —the arc value of the scale being $.676'$ for each division. The horizontal and vertical Force Instruments remained steady during the above period.

*On Porcelain Clay found at Mangalore. By A. T. CHRISTIE, ESQ.
Madras Medical Service. Communicated by Government.*

In compliance with the instructions of the Honourable the Court of Directors, conveyed to me in a letter from their Secretary, before I left England, to report proceedings to the Government of Fort St. George, I have now the honor to furnish an outline of my researches since my arrival in this presidency.

In proceeding from Mangalore by way of Cannanore, Tellicherry, and through Wynaad to the Neilgherry Hills, I had an opportunity of examining the geological structure of the country along that line of road.

The country on the coast, and probably extending to the foot of the Ghauts, consists entirely of the ferruginous claystone formation, which has been described by Buchanan, under the name of laterite. It rests upon granite and gneiss, which make their appearance in the beds of many of the rivers, and very frequently on the sea coast. The laterite is of little importance in an economical point of view, except as a building stone; but is interesting when studied in relation to the phenomena of springs, the nature of soils, and its general effects upon vegetation, to all of which subjects I propose hereafter to devote my attention. As far as I had an opportunity of examining the other formations, they appear to yield no mineral products of any value.

A few miles to the north of Mangalore, and in connection with the laterite, I discovered an extensive deposit of pure porcelain clay, very closely resembling that of Limoges in France, of which the beautiful Sevres-ware is formed. I need not point out the importance of this article. Being found close upon the coast, it might be easily shipped, and sent home as dead weight, or with the assistance of Chinese workmen, it may hereafter become an article of manufacture in India. I also found it in considerable abundance, and nearly of equal purity on the Neilgherries.

The whole of Wynaad consists of primitive rocks, with a few patches of laterite in certain situations, and great deposits of diluvium. In the latter (which consists principally) of a reddish clay, with imbedded fragments of gneiss, granite, and quartz, gold is found. On the road between Nellival and Goodaloor, I observed some shal-

low pits in the diluvium, and remarking the similarity between this deposit, and those in which gold is found in other parts of the world, I made enquiries of the natives respecting it, and ascertained that they procured gold here by washing in the rainy season. Having seen no geological account of the gold works in this part of India, I am not aware whether this metal has yet been found in its original matrix, or whether it is wholly derived from this loose transported deposit, or diluvium, as geologists call it. The latter forms a succession of low rounded hills, which are intersected by streams, and are every year partially worn down by the rains, which is perhaps the origin of the river gold of these districts.

The Neilgherry hills are entirely composed of primitive rocks, consisting principally of granite, gneiss, a large quantity of earthy felspar, quartz, and a peculiar rock, which I would name corundum rock, from its having that mineral as one of its principal ingredients. I have met with nothing analogous to it in Europe, and it occurs in great abundance; many of the hills being entirely composed of it.

Some interesting questions connected with the parallelism and elevation of strata, and other branches of theoretical geology may derive elucidation from a more minute survey of the Neilgherries, and the neighbouring country; but as these are not suited to a report of this nature, I must reserve them for the memoirs I hope to be enabled to publish at some future period on the geology of India.

The climate and agricultural features of the Neilgherries are more interesting and more worthy of attention than their geology. These hills, rising in the middle of the torrid zone, to the height of nearly 9,000 feet, present every variety of climate, from that of the plains of India to that of England. The climate of their higher parts resembles that of the great intertropical cities of South America,* which have become the centres of civilization in the new world; but is superior in one point of view, being never subject to those sudden changes and cold piercing winds, which are occasioned by the vicinity of lofty mountains, some of which are capped with snow. The mean temperature of Ootacamund is rather more than that of London,

* Quito is about 9,000 feet above the level of the sea; Santa Fe de Bogota, 8,000 feet; Mexico about 7,400; and Caraccas nearly 3,000 feet. Although the latter place has been called an earthly paradise, its climate is changeable and unhealthy.

but its annual range of temperature is very small, and it may be said, that the season of spring reigns throughout the year ; yet, though there be no winter, the heat is never sufficiently great to bring the more delicate Europe fruits to perfection, and at this height we can only expect the successful cultivation of corn and of vegetables. The valleys, which have a height of from five to six thousand feet, enjoy the climate of Italy, the climate of the vine, the olive, the orange, and the mulberry. The tea tree is cultivated in China between the latitudes of 27° and 31° in a hilly country, and consequently in a climate probably of 70° to 73° of mean temperature. Such is nearly the mean temperature of the valleys in the neighbourhood of Kotalgherry, and of many others along the Eastern and Northern faces of the hills. The cultivation of this valuable plant might therefore be attempted here, and with a much better chance of success, than in almost any country beyond the limits of China. A little lower down than this, coffee might be produced ; its native habitation being on the sides of the lofty mountains of Yemen, and nearly in the same latitude as the Neilgherries.

But with all these advantages of climate, there are certain peculiarities, which in some situations prove most injurious to vegetation, and if overlooked in any schemes for the improvement of agriculture or horticulture in these regions, might mar our best exertions. These are ; 1st, the great intensity of the solar rays when the sky is not obscured by clouds ; 2d, the great waste of heat from the ground and from plants by radiation in clear nights. The former will sometimes produce a heat of from 90° to 100° on the surface of leaves, flowers, and fruit during the day ; the latter may subject them, in the succeeding night, to a degree of cold considerably below the freezing point. Few plants will bear so great a transition, and it is only to be avoided by a judicious selection of situations, which are not likely to be much under the influence of the two causes I have noticed ; or in the case of fruit trees, and garden plants, by matting and other contrivances. I need scarcely remark, that it would be highly desirable to ascertain the meteorological characters of the different parts of the hills, before attempting the introduction of any new staples ; otherwise, in a new country, and without experience, success would be very questionable, and would rest only upon blind chance.

Next to the climate of a country, the most important object an agriculturist has to turn his attention to, is the nature of the soils. One of the most remarkable features of the Neilgherries is, the great depth of soil met with, even on the highest hills. It has originated principally from the disintegration of the earthy felspar mentioned above, which is more or less mixed with sand, is coloured with iron, and in some situations, contains numerous pebbles and small fragments of quartz, and of the other subjacent rocks. In some valleys, it contains a certain quantity of vegetable matter; and in many places on the higher hills, a thick coat of black vegetable stuff is found principally formed of decayed ferns, and which might perhaps be usefully employed for the amelioration of other soils. The ground is, in general, easily worked, but being (as far as I can at present judge) entirely deficient of lime and of every description of salt, it will probably, for certain kinds of cultivation, require to be highly manured, either with lime, with salts, or with vegetable and animal composts. Lime is clearly indicated as a manure for the Neilgherry soils; but the very circumstance which renders it so necessary; viz. its total absence among the subjacent rocks, makes it difficult to be procured. The lime which is employed in building is obtained from the kunker, (calcareous tufa,) which occurs in great abundance all over the plains of Coimbatore; upon analyzing it, however I have found it to contain a considerable quantity of magnesia, which renders it totally unfit for the purposes of agriculture, nothing being so injurious to vegetation as that earth. Were the distance, not too great, shells might be brought from the coast to improve the soil, and sea salt, and nitre, neither of which are very expensive, might prove useful.

I need not insist on the inducements that these, and some of the other hills further South* hold out to English enterprise; since the government have already by their many liberal and enlightened measures for their improvement, shewn themselves perfectly confident of the immense advantages that must hereafter be derived from them. I am led to hope, therefore, that I shall only meet the wishes of the government, when I humbly beg leave to suggest, that I may be permitted to devote part of my time to a more minute survey of them, so as

* The Pyney and Vunhogerry mountains, which have probably an elevation of from 5,000 to 7,000 feet above the sea.

to enable me to exhibit an accurate exposition of every thing connected with their physical geography, such as the height of their principal summits, the general height, form, and direction of their valleys, the climate of their different parts, the characters, and composition of their soils, the nature of their springs and streams, their vegetation, and their geology. With this view, I could establish my head quarters on the Neilgherries; for under any circumstances, it will be necessary for me to have a fixed residence, where I may leave my books, apparatus, and specimens; and as long as I continue in the South of India, the situation of these hills will be sufficiently central for this purpose.

After having remained several weeks on the Neilgherries, I came to Madras by way of Trichinopoly and the coast, in expectation of finding some secondary formations near the former place. In this, however, I was disappointed, and found that part of the country to possess but little geological interest. On the coast I was more fortunate, having discovered several curious deposits containing fossils, which are calculated to throw some light on the geological epochs of the Indian formations.

Since my arrival in India, I have made considerable collections in Zoology, and have procured some very interesting specimens of fresh water-fish, crustacea, and insects. These it will be impossible for me to describe, while engaged with my various researches in India. My time while in this country, must be chiefly occupied with collecting materials, which can be only arranged and described on my return to Europe.

Descriptions of three Indian species of Bat, of the genus Taphozous.

By EDWARD BLYTH, Curator to the Asiatic Society.

Of the several well-defined generic forms presented by the Insectivorous Bats, a perfectly distinct one exists in the *Taphozous* of the Chevalier Geoffroy St. Hilaire, or *Saccopteryx* of M. Illiger, which was founded by the former eminent naturalist upon a species discovered by him in the catacombs of Egypt, and which he has figured and described, in the great national French work on that country, by the appellation

T. perforatus; a second African species is considered by him to exist in the *Doret Volant* of Danberton, styled *T. Senegaliasis* by M. Geoffroy; and a third has been discovered in Abyssinia by Dr. Ruppell, who names it *T. nudiventer*; a fourth is described by M. Geoffroy; *T. Mauritanus*; and the *Vespertilio lepturus* of Schreber, or *V. marsupialis* of Müller, said to have been brought from Surinam (which is very doubtful, as the form would otherwise appear to be peculiar to the warm regions of the Old World), and which species (according to Mr. Gray) "scarcely appears to differ" from that first noticed, is recognized as *T. lepturus* by M. Geoffroy, and as *Saccopteryx lepturus*, by M. Illiger. Another alleged American species is the *T. rufus* of Dr. Harlan, founded on the Bat figured in Wilson's American Ornithology, on the same plate with the American Eagle owl; but a glance at this figure is quite enough to shew that the animal belongs to a widely different genus of Bats, and it is supposed by Mr. Gray to be not improbably the *Vespertilio pruinus* of the late accomplished American naturalist, Mr. Say, which Mr. Gray refers to *Scotophilus* of Dr. Leach, (synonymous with *Nycticejus* of M. Raffinestque). The *Taphien flet* figured in the work on Egypt, is the type of the distinct genus *Rhinopoma*, and is stated to have been termed a "Taphien" on the plate by mistake. The only Indian species which has yet been described, to my knowledge, is the *T. longimanus* of the late indefatigable Major General Hardwicke, of which a description and plate are given in the fourteenth volume of the Linnæan Transactions, (p. 525). This is mentioned as being "common in Calcutta, in dark store-rooms; at night it frequents habitations, attracted by the light of the candles and numerous insects." Finally, in the valuable "Catalogue of Mammalia inhabiting the Southern Mahratta country," published in the Madras Journal of Literature and Science (Nos. 24 and 25), by Walter Elliot, Esq., we are informed that "only one specimen of *Taphozous* was obtained, of which the description has been lost." (p. 99.)

The members of this group are distinguished by a conically-shaped head, flattened on the face, and having a large and deep circular concavity between the eyes; the nostrils are small and terminal, approximated, and capable of closure at the will of the animal; the ears are widely separated, somewhat triangular, and broad at base, a fold of skin being continued from the base of their upper and fore margin to the border of the

frontal depression above the eye, and another forwards from the lower margin, which is furnished with a lobe corresponding to the "drop" of the human ear, only it is not pendent, and the base of it is even with the mouth; the conch usually lies flatly outwards, the anterior margins of the two ears forming a straight transverse line, and their medial part collapses into plaits, which are obliquely transverse with the tip, as is more particularly noticeable in the living animal; within the conch is a short hatchet-shaped tragus, nearly as broad again at the extremity as at the base. The wings in this genus are long and rather narrow, the short thumbs being furnished at base with a small and slightly flattened cartilaginous cushion, which is more or less observable in other Bats, and is only more developed in certain *Dysopodes*, or (according to Mr. Gray) the young of these, supplying the trivial character upon which Spix founded his subdivision *Thyroptera*: the innermost digit is connected at base to part of the fore-arm by a small internal membrane, forming a little sac, whence the name *Saccopteryx* of M. Illiger. The tail of these Bats is more or less elongated, and is enveloped at base in the interfemoral membrane, from the upper surface of which, about half way from its margin, the extremity protrudes in proportion as the membrane collapses, to a variable extent (apparently) in different species, curling round backwards and upwards in the attitude of repose, and becoming sheathed as the membrane is expanded. Another curious character, more or less developed in the different species, and chiefly in the males, consists in a large gular sac, the orifice of which is anterior and transverse; on the chin are two slight, parallel, and nearly contiguous, longitudinal folds of the skin (which in certain species, are rudimental), each subdividing into two smaller folds posteriorly, the channels between which lead to the sides of the throat-sinus; the interior of the latter would appear to be glandulous, though I have been able to perceive no trace of secretion. On the middle of the upper lip is a slight duplicature; and the top of the lower lip is conspicuously reflected, having a mesial groove; the mouth is cleft to beneath the forepart of the eye. These animals, according to Cuvier, have one pair of upper incisors, though often none, and the latter is the case with five specimens before me, appertaining to three species; they are probably pushed out by the growth of the permanent canines (as in various other Bats), which of course follows after some time the renewal of the properly deciduary, or "milk"

incisors, and therefore may be of some utility for a time, co-existing with the first canines, but no longer required when these are supplanted; in the lower jaw are four distinctly trilobated incisors: behind the upper canines are one or two very minute false molars, then a large sharp pointed one, corresponding to the *canassier* or "scissor-tooth," and posterior to this are two large subquadrangular true molars, less elevated than the last, and succeeded by a small transverse third true molar; below are two large pointed false molars, and two large and one small true molar, corresponding to those above. The fur is soft, close, and velvety, and in most species plentiful, being generally, if not always, slightly grizzled towards the extremity of the pile.

The first species I have to notice is the

T. longimanus, (?) Hardwicke: but as the details furnished by that observer are, for the most part, of generic rather than specific import, it may prove to be an allied one, though I do not think this probable. The only specimen I have seen is an adult male, for which I am indebted to my valued friend, and former European acquaintance, Dr. Cantor, in whose residence in Calcutta it was captured. The description and figure are taken from the recent animal.

Length, from nostrils to end of tail, $4\frac{3}{8}$ inches, the membrane extending $\frac{7}{8}$ inch further; alar expanse 16 inches; tail 1 inch, capable of protrusion $\frac{3}{4}$ inch, and of being sheathed for its whole length; ears, posteriorly $\frac{5}{8}$ inch, or anteriorly to inferior lobe even with the mouth, above $\frac{7}{8}$ inch, their breadth at base $\frac{5}{8}$ inch, and tips apart as they lie flatly outwards, $1\frac{3}{4}$ inch; tragus $\frac{3}{16}$ inch, and of the usual hatchet-shape, widest at the extremity. Length of fore-arm $2\frac{5}{8}$ inches, and from wrist to end of wing above $3\frac{1}{2}$ inches; tibia 1 inch, and foot minus the claws, $\frac{1}{2}$ inch; two small longitudinal excrescences on the chin, but no throat-sac in the specimen, though the site of this is indicated by a semi-nude rudiment of the structure in question. Colour of the fur uniform dark fuscous-brown above, slightly tipped with a lighter colour, and pure white at base; beneath paler, except on the throat, from being more conspicuously tipped with brownish-grey; the fur everywhere very close and full, rather short, and soft, and velvety; face almost nude, and with the membranes darker than the back; the ears, as usual, naked externally, except at their posterior base, and on a fold near this; within are a few minute hairs.

General Hardwicke's animal is stated to have measured " $\frac{9}{10}$ inch between the ears," though it is difficult to understand where he fixed the boundary of their bases; but raising the ears, for they naturally lie flatly outwards, (as in the *Rhinopomata* and *Dysopodes*,) the distance between those of my specimen scarcely exceeds $\frac{1}{2}$ inch, and as General Hardwicke's Bat was only "5 inches long, and $14\frac{1}{2}$ inches in extent of wing," I doubt whether a greater interspace existed between its ears than in the subject before me, notwithstanding the figure given, which has doubtless passed through the ordeal of a native artist, in addition to that of the engraver. "The body," he says, "is thickly covered with a very soft hair, in the adult of a snuff brown; the legs, wings, and membranes black: but the full-sized young are of a deep black on all parts." To this I will add, from his Latin quasi definition of the species, "*supra ex fusco rufescens, subtus pallidior*," and what remains is wholly of generic application. The absence of any notice of a throat-sinus adds negatively to the probability of the specimen before me being correctly referred to *T. longimanus*; while, on the other hand, the whiteness of the base of the fur, which is conspicuous when that of my animal is ruffled by handling, is not a likely feature to be quite overlooked. However, if it should prove to be the only Calcutta species, or the only one at all numerous in this district, our doubts may be pretty safely set aside about the correctness of the identification.

T. fulvidus, Nobis.—Of this species I found two males and a female preserved in spirits in the Museum of the Asiatic Society, but cannot learn where they were obtained; though I have been informed that it is common at Darjeeling. It is smaller than the last, with proportionally smaller ears, a deep throat-sinus, and fur pale fulvous-brown at base, grizzled towards the extremity with darker-brown, the extreme tips whitish: some have the nape and interscapular region ungrizzled fulvous, and the under-parts are more slightly grizzled than the upper: face very pale, and membranes also of a light colour.

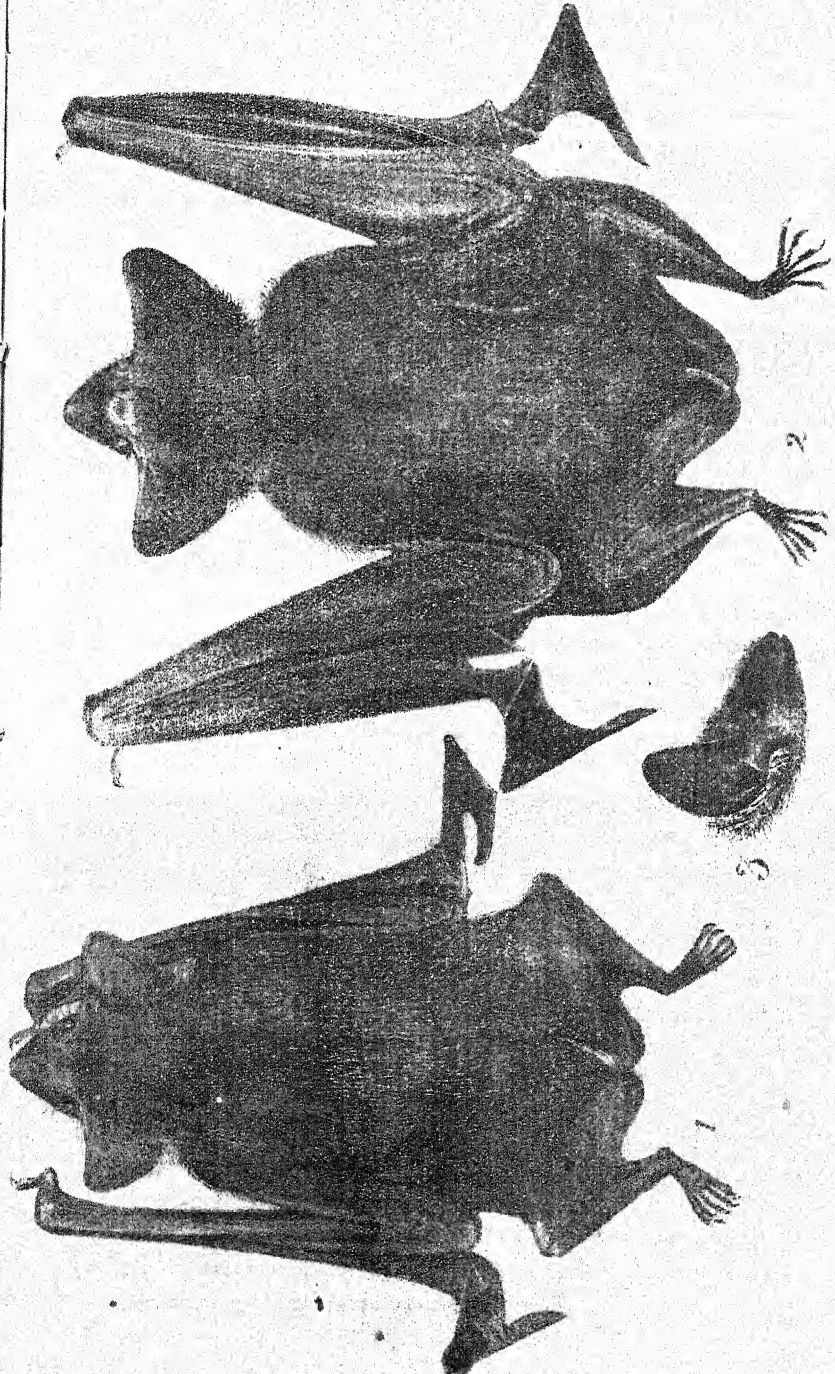
Length of the finer male $4\frac{1}{8}$ inches from nostrils to tail-tip, the membrane extending $\frac{3}{8}$ inch further; alar expanse $13\frac{1}{2}$ inches: length of the female, to end of tail, $3\frac{5}{8}$ inches, and alar expanse 13 inches. Tail (of the male) 1 inch, of which half would seem to be enveloped in the membrane and incapable of protrusion, nor does much of the remainder appear to be capable of being sheathed when the membrane is ex-

tended ; though this may perhaps be owing to the parts having become rigid by lying in spirits : ears, posteriorly, $\frac{3}{8}$ inch, and anteriorly, to the lobe even with the mouth, $\frac{5}{8}$ inch ; their breadth at base $\frac{3}{8}$ inch, exclusive of the duplicature of skin over the eye ; and tips apart, as they lie flatly outwards, $1\frac{3}{8}$ inch : length of fore-arm $2\frac{3}{8}$ inches, and from wrist to extremity of wing $3\frac{5}{8}$; tibia 1 inch ; and foot, minus the claws, nearly $\frac{1}{2}$ inch : beneath the nostrils is a duplicature of the upper-lip, (rudimental in the preceding species,) divided except in front, and merging laterally into the inner surface of the lip ; under-lip reflected as usual : the throat cavity fully developed, but rather less so in the female : colour of the fur as described.

T. brevicaudus, Nobis.—For this species I am indebted to the kindness of Dr. Coles of Madras, who presented to me, for the Society, a collection of skins of Mammalia obtained at Travancore, among which was a single specimen of this Bat, which is at once distinguished from its known congeners by the shortness of its tail.

Length, from nostrils to end of tail, about 3 inches, the tail $\frac{5}{16}$ inch, and entirely enveloped in the membrane, though perhaps merely sheathed in it, and capable of some protrusion ; the membrane extends considerably less backward beyond its tip than in the others : alar expanse about 13 inches, or perhaps rather less : ears posteriorly, $\frac{1}{2}$ inch, or anteriorly, as in the others, $\frac{5}{8}$ inch ; their breadth at base $\frac{1}{2}$ inch ; and distance of the tips apart, as they lie flatly outwards, $1\frac{1}{2}$ inch. Length of fore-arm $2\frac{1}{2}$ inches, and from wrist to end of wing $3\frac{5}{8}$ inches ; tibia nearly $\frac{7}{8}$ inch, and foot, exclusive of claws, under $\frac{3}{8}$ inch. No sign of throat-sac in the specimen, and the merest trace of the excrescences under the lower jaw. Fur dingy-white for the basal half, the remainder dusky-brown with light brown at the extreme tips, which last is more developed on the under-parts. Membranes apparently pale, and face dark.

In conclusion, let me avail myself of the present occasion to request from those who may be interested in the elucidation of Indian Zoology, to lose no opportunity of securing specimens of as many species of Bat as fall under their observation ; these should be placed in spirits (though not too many in the same vessel, or they speedily decompose) ; and in the present state of our knowledge respecting the species inhabiting India, it is desirable that many examples of each kind should be preserved for distribution to different Museums, by which means a certainty of



1 *Taphoroxys fulvidus*. 1: 2 *T. Longimanus*; 3 Head of do.

the correctness of the names attached to them can be ensured, and the value of the specimens thus enhanced. At present, the Museum of the Asiatic Society is sadly deficient in species of this interesting family.

December 5th, 1841.

Extracts from a Report on subjects connected with Afghanistan. By
DR. GRIFFITH. *Communicated to the Editor, from the Political*
Secretariat of India.

PART III.

NATURAL PRODUCTIONS.

Wild Animals.—None of the wild animals of the country appear to be of any considerable importance. They are comparatively speaking, few in number, and none attain any large size. The most important from their size, and probably from numerical extent of individuals, are the wild sheep and wild goats, of which last there are probably three distinct species, at least, in the country. The chase of these animals for their flesh, which is, I believe, held in considerable estimation, both by Europeans and Afghans, is attended with considerable difficulty and exposure, and is principally confined to the winter months, during which these animals are forced to take up lower ground. The animals of the above nature known to me are,—

1st. The Wild Sheep, *Ovis Argali*?—The only specimen of this I have seen alive was in the possession of Captain Ferris, at Peshbolak. With the head and barrel of a sheep, it had the legs, the muscularity, and activity of the antelope kind. Nothing can be imagined greater than the agility and sure-footedness with which it would gallop along the top of the narrow ramparts of an Afghan fort, and precipitate itself down from its bastions. It was perfectly tame, and naturally gentle; and seemed to prefer Europeans to Hindoostanees. In choosing its companions and females, it was by no means select, and appeared quite capable of pleasing a whole flock of ewes and she-goats. I regret to say, that perhaps from want of any very great affinity between the species, no marked breed has resulted from this extensive crossing.

Of wild goats, I believe I have seen portions of two species, one of which was sent me by Captain Macgregor. I have never seen either alive. A species of Ibex also exists, with this I am only acquainted from the horns, which it is the custom to attach indiscriminately to the *Zearuts*, and places of sacred note.

From the forests of Olipore, I procured a species of Antelope of the Goral kind ; this is known to the natives of those regions by the name *Suga*. Other species doubtless exist in the dense forests of that part of the country, such, for instance, as the Musk Deer. I also heard of another ruminating animal, which the Olipores called Goomast ; but their description was so extraordinary, that I could make nothing from it.

Afghanistan possesses wild Asses, but these are confined to the western and north-western parts of the country.

From the general scarcity of jungle and of animals, the country derives one advantage at least, in the absence of the larger carnivora. Mr. Elphinstone, in his very excellent and extraordinarily accurate account of the kingdom of Cabul, mentions, but with doubt, the existence of Lions in the hilly country about Cabul. If Lions do exist in any part of Afghanistan, they must be looked for, it appears to me, to the West.

Of Tigers.—I did not get any information ; for even about Olipore, where the upper part of the hills is covered with forest, the lowermost parts and the sides of the vallies do not present much deviation from the ordinary Afghan nakedness, and this is ill-suited to what we know of the habits of these animals. Leopards exist about Chugurserai, and probably in all the wooded portions of the Sofaid-koh system. A large wild Cat, with a tendency to the Lyncean tuft on the ears, is also met with about Olipore.

A large and a small species of Fox appear to exist. The former, which is perhaps identical with the large Himalayan Fox, I procured from Quettah and at Olipore, at which place it is not uncommon. The small kind seems to resemble the Fox of the plains of N. W. India. Jackalls were observed at Quettah, and in the Koonur valley. Of Wolves and Hyænas I did not hear, although the nature of many parts of the country would appear, from what is known of the habits of the Indian species, well adapted to them. Of this I am quite sure, that if they do exist, their existence must be more than ordinarily

precarious, especially during the summer months, when the flocks are driven far away into the high districts. The other carnivora known to me are the Mongoose, and a small prettily marked animal of the same family, which I saw alive in the possession of an officer of H. M. 13th Light Infantry.

Wild Hog occur in some parts, such for instance as the valleys of Jellalabad and Peshawur; in certain parts of which last, along the Cabul river, they are reported to be numerous. No domestic swine are to be seen in the country, the untravelled Afghans therefore cannot appreciate the reasons which led to their being denounced as unclean. They do not, however, hold them in less abhorrence than the Mussulman of Hindostan, who has daily evidence of their filthy habits. Afghanistan possesses one species of Hedgehog of small size with large ears. It is among the rat-like or rodent animals that the greatest variety in form is to be found. In this direction, as in the Flora, the transition between Afghanistan and India may be observed in the dry parts of our extreme N. W. provinces.

Of these animals two only exist of any size; the largest is the Porcupine, which is to be found in the lower parts of Eastern Afghanistan, and a Marmot of about the size of a Beaver, which I have seen on the mountains about the Hageeguk Kaloo and Erak passes, on which it occurs between 11,000 and 12,000 feet.

It attracts notice chiefly by its loud whistling, but otherwise is a very wary animal; it may be occasionally seen sitting erect on its hind quarters at the entrances to its burrows. Of the smaller rat-like animals, several species exist in the collection: the most striking, from its novelty, elegance of form, and agility, is the Jerboa, which was first seen at Quettah, and was afterwards found to be of pretty general occurrence throughout the moderately elevated parts of the country.

One species of Hare was observed to be tolerably common along the valley of the Turnuk. There are, however, probably two other species in the country, as I observed one in a very different locality among the hills at Targeen, and another among the snows of the Koh-i-Baba. No Rabbits exist: their place is perhaps supplied by a species of Lagomys, not uncommon in rocky ground about Cabul, and perhaps generally between an elevation of 6 and 8,000 feet. By some of the officers these little animals were said to have been eaten as Rabbits.

Although not with strict propriety referable to a division headed Natural Products, which, in the excellent statistical arrangement of that wonderful man, Dr. Buchanan Hamilton, is limited to those things supplied by nature without the assistance of man, I have appended to my brief notices of the wild animals, those of a domestic nature.

Domestic Animals.—These are horses, ponies or yaboos, asses, mules, camels, or dromedaries, oxen, buffaloes, sheep, goats, dogs and cats. On the whole in this branch of domestic property, Afghanistan may be considered as rather rich.

Horses.—The horses are heavy, but are said to be enduring. I suspect that their qualities, as well as those of the Toorkistan horses, have been a good deal overrated. On this point, however, I am not competent to remark, besides Government must be in possession of abundant information, as to their value for Cavalry or Draft purposes. The mode of treatment of horses by the Afghans differs considerably from that in use among us. Afghan horses have their stated and defined meals; with us, food is always before them. I think the Afghan plan is the more natural of the two.

Ponies.—The ponies are chiefly used as beasts of burden, for which purpose the larger and stronger kinds are admirably adapted. These, however, are not easily procurable. Although expensive to feed and keep in good condition, the quickness with which they get over the ground, and the ease with which they surmount the obstacles presented by bad roads, renders them greatly preferable to camels.

Asses.—The native asses are not very fine, but those imported from Turkistan are perhaps among the finest. The males are sent across the mountains, they are generally white, have their nostrils slit, and fetch a high price, say 100 to 120 Rs. at Cabul.

Mules.—Very few fine mules are procurable even for very high sums. Although not so fast as yaboos, which in the hands of Afghan drivers seated on the top of a load of 3 and 4 maunds, will go at the rate of 5 miles an hour for 15 miles; they are more enduring, and much less expensive to keep; on the other hand, they are said to be more liable to be galled.

Dromedary.—The Afghan dromedary is decidedly a very fine animal, remarkably different in general configuration from that of Hindoostan, having a round, handsome, and compact barrel, and short

strong legs. The outline of the head and face are very different, and the upper lip is much less pendent. The under-hair or wool of the dromedary affords excellent materials for warm, strong, and cheap clothing, and the Afghans avail themselves largely of it. In this country, these animals are always driven, not led, neither are they incommoded with a nose string. Hindoostan camels are not adapted to the climate of Afghanistan, or the stony surface of the country; it was found, that unless as well cared for as horses, they are by no means enduring animals, being exceedingly impatient of cold and wet; and though not great drinkers, impatient of the want of water. Although the Indian camels accompanying the Army of the Indus underwent great hardship, and suffered from change of diet or absolute privation, yet great part of the great loss was occasioned by the cruelty and carelessness of the *surmans* or camel-drivers; than whom, even in Asia, a more worthless set does not exist. Captain Fraser of the Cavalry was one, among the very few officers, who did not lose a single camel between Ferozepore and Cabul. From his experience it would appear, that with good grooming, clothing, and feeding, the Indian camel may be depended upon. Perhaps this may be deemed worthy of some attention. At present the well-being of the carriage of an Army is almost entirely left to the natives, who in addition to their other bad qualities, are merciless and most improvident masters. At Urghundee, I counted about 20 camels, which had recovered after having been deserted and deprived of a large portion of skin containing the mark, which it was necessary to shew to secure compensation. On grooming and clothing I am the more inclined to lay stress, as I am aware that the Government camels always had, whenever it was procurable, a liberal supply of grain.

Camel.—The Bactrian camel is not common in Afghanistan, the cross between it and the dromedary is a remarkably handsome and valuable animal. Of the remaining domestic animals, only the sheep, goats, and one or two breeds of dogs, are worthy of any detailed notice.

Sheep.—The sheep, are all dombas, like the Cape sheep, remarkable for the great development of fat in their tails. To the Afghans they are of inestimable value, supplying them with cheap clothing admirably adapted to the climate, with milk, and the favourite preparation from it, *kroot*, a sort of dry curdle, which did not appear to me at all

palatable, also ghee, and I believe oil. The flesh varies a good deal, but generally was not much esteemed by us. When gram-fed it is, I believe, excellent.

The sheep are very numerous, and are generally the property of the Nomadee tribes, whose character might make us look with suspicion on the alleged innocence of the pastoral lives of old. In the cold weather, so far as I have seen in eastern Afghanistan, they are congregated in the low districts; at this season I have seen vast flocks about Lalpore and Dukka. At the commencement of the hot season, they are driven to the high grounds, such as the Hazarah country, between Cabul and Bameean. Each flock appears to be generally led by a goat, to whose movements the sheep pay implicit attention.

Goats.—Goats are also numerous, and perhaps equally worthy of attention, their wool is used largely; and appears to be a promising article. These and the sheep are the only animals that could derive sufficient nutriment from the Afghan mountains, which generally speaking, are remarkably deficient in grassy vegetation. I think they feed principally on the aromatic and thorny plants, which form the principal mass of the vegetation.

Dogs.—The common dog of the country appears to approximate a good deal to the Pariah of the plains. But the Tajee grey-hound, a large handsome animal with exceedingly long curly hair about the legs and ears, (I speak of the animal as I have seen it at Cabul in the summer,) might be introduced into England perhaps with advantage. Although doubtless much less speedy than the high-bred English grey-hound, in their *bone* they may be found to possess advantages which it might be desirable to transfer; the Afghans are also said to possess excellent pointers, but of these I have no personal knowledge.

AGRICULTURAL PRODUCTS.

Of the cerealious or culmiferous plants, Afghanistan possesses wheat, barley, rye, rice, Indian corn, and millet.

Wheat.—Of these, wheat and barley are the most important generally, although rice and maize, especially the former, constitute a considerable proportion of the summer cultivation. Some of the Ghuzni wheat was considered particularly fine. I sent some of the finest I

could get in India for transmission to England, but am not aware what value was assigned to it.

In connection with this, I may mention, that there is an important remark in Dr. Falconer's report on the Seharunpore garden, on the inferior nature of the albumen of our Indian grains. Government might probably deem it advisable to encourage the transmission of specimens of all the finest sorts from Afghanistan to India; some of those of Candahar may reasonably be expected to turn out well adapted to India.

In endeavoring to effect this highly desirable purpose, the following remark of Dr. Falconer should be kept in view, as a guide to the selection of the finer kinds:—"The body of the seed of the European wheat was formed of a farinaceous powdery albumen, which flew off into a dust on crushing; while the Indian grains were seen to consist of a hard horny-looking albumen, which was broken with difficulty, shewing what English agriculturists call "a sleety body" and indicating a comparatively very inferior grain. Throughout Afghanistan, wheat may be considered as the staple grain of the inhabitants. It is generally eaten in the shape of bread, baked in flat oblong cakes, about an inch thick; the better kind is very light and well flavored."*

Barley.—Barley appears almost exclusively used for feeding horses.

Rye and Oats.—I do not remember rye occurring as a distinct crop; but it is not uncommon, as a mixed one. The same may be said of their oats, but these perhaps are really wild. The greater part of many of the fields about Bamean consisted of oats, but as the grain ripens, and falls out before the wheat is ready for the sickle, the only use it can be of is, as affording straw for winter fodder.

Rice.—Rice occurs extensively about Cabul, the highest elevation at which I have seen it cultivated in Afghanistan is about 7,000 feet. It is all of the wet or *shallee* kind. The only particularly fine rice grown west of the Indus, is that called *shallee bara*, grown near Peshawur. The production is very local and very limited; introduced elsewhere it appears to degenerate into the coarse common kind. It has a long grain, and is of such esteem, as to be among the list of presents between crowned heads of the North-west.

* It is from wheat that the favorite article *fuloodah* is made; this appears to be some thing analogous to our vermicelli.

Maize.—Maize, or Indian corn, is largely cultivated, especially about Peshawur, where its flour is said to constitute the chief sustenance of the inhabitants. Sorghum and bajra are likewise frequent in the lower parts of the country.

All these enter into other uses than merely giving nutritious grains. The young wheat and barley are cut, and given as green fodder to cattle; this is esteemed especially serviceable in improving condition, and is known by the name of khased. The straw of all is taken great care of, and chopped up into boosa.

The stout stemmed kinds, as Indian corn, sorghum, and bajra, are given entire to cattle, who eat the leaves and the ears; they are stored for winter fodder at least in some parts, and are then cut into small pieces, in this state it is called khurbee. None of the other grains are worthy of notice, the supply being limited, and the product very inferior.

Of leguminous grains, the Afghans cultivate muttur, a sort of chunna, or moong; but I know of none so good, or so extensively useful, as to merit detailed notice. As might be expected, with the exception of muttur (peas), these are confined to the warmer and more tropical parts; all may be observed about Jellalabad.

Oily-seeded Plants.—Of oily-seeded plants, mustard is the one universally cultivated; they have also another species chiefly confined to the lower districts, in these also sesamum, or til, may be met with. The country also possesses linseed, but I have never seen it extensively cultivated.

Sugar.—The only place in which I noticed sugar was in the valley of Jellalabad, where it occurs to some extent. It appears to be the same kind as that in common use throughout the North-west. The chief supply of sugar, which from the fondness of Afghans for sweet-meats must be considerable, appears to be derived from the plains. Coarse sugar-candy, in flat cakes, was procurable in 1840 at Cabul, for one-half to two seers the rupee; a coarse kind of Russian loaf sugar, was common also in the market.

Cotton.—Cotton is entirely confined to the lower districts, a good deal is cultivated about Jellalabad. Two plants are cultivated for their colours.

Madder.—Safflower and madder. The former occurs extensively about Cabul, and is perhaps worthy of a more detailed notice than I

am able to give it. Maddar is confined, so far as I know, to western Afghanistan. About Candahar it is common; it is planted on trenched ground; the green parts are given as fodder to camels; the roots are allowed to remain untouched for two, three, or five years, or even seven, the quality of those dug up early is inferior. The price is, I was told, six Hindoostanee maunds for one rupee. Maddar forms an extensive export to Bombay; it is, I believe, the same species as that cultivated in Europe.

Tobacco.—Tobacco of excellent quality is grown about Candahar, chiefly I believe in the valley of the Arghandab. This again is one of the agricultural products, upon which detailed information, accompanied by samples, is necessary.

Natural Grasses.—No valuable natural grasses occur, it would appear, in Afghanistan, except on the Chummun. The doab-grass is found throughout, but I do not think it is used by the Afghans. No hay is made in any part of the country I have visited, throughout the poorer and less favored districts, such for instance as the Hazarah country between Cabul and Bamean; the wild plants of the hills are cut almost indiscriminately, and when dry are carried to the villages, and stored on the roofs of the houses and towers for winter use. The various kinds of thistles, the large leaves of the rhubarb, and indeed the whole of such plants as are absolutely not too dry to afford nourishment, are thus made use of.

Artificial Grasses.—To supply the wants of fine natural pasture grasses, Afghanistan possesses very fine artificial ones in lucerne and clover, these are extensively cultivated, requiring no great care, but plenty of water. In the green state, they constitute the greatest, and most valuable part of the food of the cattle, and in the dry state, in which they are twisted into coarse ropes, they are extensively used during the winter months.

The lucerne is the same species as that cultivated in the Northwest parts of India and Europe; it occurs throughout the country at almost every altitude.

The clover, which is unlike any of the English cultivated species I remember, is a beautiful, and when in flower, a very fragrant plant, it has long succulent tender trailings, stems, and heads of bluish flowers. It first attracted my notice about Ghuzni; it is common at

Cabul, and about Khujjah, below which I do not remember having seen it. By the Afghans it is not so much esteemed as lucerne.

Of the number of seeds despatched by me, by order of his Lordship the Governor General in Council to the Superintendent of the Seharunpore garden, for transmission to Europe, these two would appear to be by far the most valuable, indeed perhaps the only ones worthy of introduction into Europe. The accounts that have appeared of their success, especially that of the lucerne in Ireland, are particularly interesting, and very gratifying to me.

Vegetables.—In vegetables Afghanistan is very poor, although Mr. Vigne has published a list of the Cabul vegetables, worthy of a Covent Garden market; the whole may I think be summed up in the following list: cabbages, cauliflowers, beet-root, spinages, radishes, carrots, bangs, lettuces, cucumbers, onions, and garlic.

Of these only the beet root and cabbage are worthy of notice. The extensive introduction of good European vegetables would confer a real boon on the country. Sir A. Burnes several years ago introduced the potatoe, but on his return to Cabool with the army, he found they had all been lost.

Flowers.—The Afghans do not appear to be skilful florists; no one of their cultivated flowers is worthy of notice. I remarked at Candahar and Cabul, roses, jessamines, marigolds, pinks, sweet-williams, poppies, larkspurs, stocks, wallflowers, narcissuses, flags and China asters, which last are the handsomest, and of the most varied colours.*

Fruits.—In fruits the country is remarkably rich, and although the Afghans are acquainted with grafting, the perfection to which several of the finer fruits has reached, appears to me remarkable; it certainly is more attributable to the climate, than to any skill on the part of the Afghans; there is every reason for believing, that from the improvements they will become acquainted with from their intercourse with us, Afghanistan will become one of the finest fruit countries in excellence, and variety of product. Should success ultimately attend the praise-worthy efforts of Drs. Royle and Falconer to introduce cuttings, &c. overland, Afghanistan should not be omitted in the distribution. Fruits in this country are of a more important nature than

* Hawthorn trees, and the famous Arghawan, occur in Baber's garden at Cabul. This last is, I believe, *Cercis Siliquastrum* of Botanists.

they are in India, or perhaps most other countries in which they are not generally to be considered as absolute necessities of life. In Afghanistan, however, several kinds assist very largely in the sustenance of the bulk of the population.

Few things can be seen more striking to a person accustomed to India, than the display of fruit in the markets and shops of Cabul ; few things more astonishing than their very low prices. Even after the whole army of the Indus had been encamped at Cabul for some weeks, they still continued remarkably cheap.

The Afghanistan list of fruits includes

Apricots (zurd-aloo), two or three kinds,

Peaches (shuft aloo),

Nectarines,

Plums (also bokhara), several kinds,

Bullaces? (aloocoa),

Cherries (aloo waloo),

Apples (saioo), several kinds,

Pears (nass puttee), two or three kinds,

Quinces (bhel),

Pomegranates (unnar), two kinds,

Grapes (ungoor), several kinds,

Musk melons, (khur-booja, gurm),

Sinda ditto, (khur-booja, surda),

Water ditto, (turboozah),

Mulberries (toot), two or three kinds,

Walnuts (char mughz),

Figs (unjeer).

Of these, the most important, as constituting an article of food in large consumption by the mass of the inhabitants, are the common kinds of apricots, plums, grapes, melons, and mulberries.

The best flavoured fruits, and generally they may be pronounced excellent, however disfigured and liable to be bruised, they are by the dirty and rude hands of the Afghans, are the khaisee apricots, peaches, nectarines, most of the grapes, the musk melons, the smaller kind of pear, the large red mulberry called shahtoot, closely resembling the good English mulberries, and the seedless (or bedanah) pomegranates.

Most of these fruits are consumed in the country ; some, such as a large thick-skinned grape, (like the exported Portugal grape), the seedless pomegranate, walnuts, apples, and figs are exported ; but with the exception of the grapes, perhaps, in no great quantity, large quantities of the thick-skinned grapes alluded to are consumed in winter throughout the country.

From many preserves are made, and commonly sold in the bazaars. Some again, especially the apricot, kissmiss grape, fig, and white mulberry are prepared by drying ; the apricot in this state, is, I believe, called goobani. The dried mulberries abound in saccharine matter, and are used to a considerable extent, as is likewise the dried kissmiss or raisin.

The peaches are of large size, and good flavour, but are generally damaged by premature plucking and rough usage, the Afghans not being acquainted with the European niceties attended to in gathering such fruits. Nectarines I did not see, but I was told that they are grown at Candahar. None of the plums are particularly good, and the cherries are much more adapted for preserves, than for eating fresh.

Of the several kinds of grapes, I prefer the kissmiss ; this is a small roundish, seedless, grape, of a greenish colour, tinged with brown when perfectly ripe. Besides this, Afghanistan possesses a very large oblong fleshy purple grape ; a green grape of similar properties, other respects than colour, chiefly kept for winter use and for exportation ; a large highly flavoured round purple grape ; a dark purple round sweet grape, with very large and very small fruits on the same bunch, the small ones being seedless. All these, and I dare say more may be procured at Cabul or Candahar. There is also a very large round sub-fleshy green grape, the *ungoori kuttah*, which is produced along the N. face of the Sofaid Koh, as about the Khujjah district.

The surda melon is, I think, unknown in India ; it is very distinct, apparently both from the musk and water melon, is of an oblong shape, with firm whitish flesh ; it is sweeter than the musk melon, to which I think it very inferior. It must be remarked, however, that it is said only to attain its perfect flavour after having been touched by the frost ; it is in extensive use throughout the earlier winter months.

The seedless pomegranates have a high reputation. I never was fortunate enough to meet with really fine ones.

To the list may be added perhaps the zurishk or barberry, which is generally eaten as a preserve; a sort of bhair called aral; the dried pulp of the sinjit, a species of *Eleagnis*, commonly planted about water-courses in the finer vallies and an *Hippophaee*, which I was told was considered a fruit at Cabul. Date trees, but very few, occur at Jellalabad; this fruit is imported in considerable quantities. Citrons also are common in the Jellalabad gardens. The palm of superiority of fruits is I believe, disputed by Cabul and Candahar. Ghuzni is celebrated for its plums, to which, and to apples, its supply is chiefly limited. The fruit season lasts throughout the summer months; there will of course be some difference between the seasons at Candahar and at Cabul. The earlier fruits are chiefly confined to such stone fruits as cherries and plums. The grand season at Cabul is in August and September. The most widely distributed fruit tree is the common mulberry; this is found everywhere, up to elevations of 8 and 9,000 feet; wherever there is a village, there will be found the white mulberry.

The range of the apricot may be stated as between 3,000 and 8,000 feet, it is also met with higher, but scarcely produces beyond that elevation. I have seen it in the Erak ravine as high as 10,500 feet. Walnuts are, so far as I know, limited to considerable altitude, such as that of Cabul, 6,400 feet.

Pomgranates range from 1,200 to 5,000 feet, at Khujjah; 4,500 feet above the sea, they are said to attain great perfection. With regard to cultivation, I am not aware that any great skill is applied. To the unclouded summer sky, the great dryness of the air during the season, the goodness of the soil, and facilities of irrigation, I am inclined to attribute the good qualities of the fruits. It is scarcely necessary to add, that all the trees are standards. Most, if not all the stone fruits, as well as the apples, pears, and mulberries, are planted as orchards. The grapes at Candahar are planted in trenches, to the north face of which they are confined; in most other parts, they appear to be allowed to scramble over trees.

Introduction of the Afghan fruits into India.—A good deal has, I believe, been said of the probability of the successful introduction of the Afghan fruits into India. But if we look at the opposite peculiarities of the two climates, to speak generally, we are not, I think, warranted in expecting such a result. I do

not wish to disparage such attempts, but it appears to me that in all such inquiries there are certain requisite preliminary considerations to which no attention is generally paid in India. In Afghanistan, we have a considerable increase of latitude, accompanied by a considerable increase in altitude, at least so far as the great fruit districts are concerned. We have a cold or a very severe winter, during which, and also about the vernal equinox, snow or rain falls to a considerable amount, constituting as it were a sort of monsoon. This is succeeded by an almost absolutely dry summer and autumn, during which the sun exercises an unchecked and powerful influence. These two last circumstances are, I believe, essential to the perfection of what we call the later European fruits. In what part of the continent of India can these circumstances be found? We may command elevation, but in no Indian climate known to me can we command a cold winter, a genial spring, and a fine summer. In India on the plains, the spring months are very hot, and the time of ripening of the later and better fruits falls in the rainy season. The Coromandel coast agrees with Afghanistan in the distribution of the rainy and fine months, but in no other circumstance. If we go to the hills, we become exposed to an increased severity of summer rain.

No fruit-bearing plant of Afghanistan can, I think, be reconciled with any success to such extremes. It is curious that Peshawur, which has an Afghan climate, so far as rainy winter months and a dry summer are concerned, does not possess, perhaps, a single superior European fruit. Can we infer from this, that a certain amount of winter cold is required for the attainment of excellence? With Bengal Proper, I would not advise interchanges to be made. If it be considered advisable to introduce the Afghan fruits into the N. W. provinces, which have a very different cold weather and rainy season from those of Bengal, I would beg to suggest that the introduction be carried on from Candahar. I find on referring to my journal, that grapes and musk melons were coming into season about the 15th or 20th June. This is about the period of the setting in of the rains in the N. W. as about Merut; but the smaller amount of cold of the Indian winter, and the greater amount of heat of the spring, would doubtless cause the ripening to occur earlier, so that the fruits would be exempt

from the injuries of rain. If introduction into the Himalayas be deemed desirable, Cabul should be the place of supply, unless there is some unexpected affinity between the amount of solar heat of the spring months these mountains enjoy and that of Candahar. And perhaps attention should be chiefly directed to those fruits that are in full season before the middle of June.

General Nature of Afghan Vegetation.—Before entering on a few brief notices of those vegetable productions which are not cultivated, but which administer to the wants of the people, it may be as well to premise a few popular remarks on the general nature of the Afghan vegetation. No parallel can be drawn between the Afghan Flora and that of India in any part; for even in the lower parts of the country, but very little elevated above the general level of our extreme N. W. Provinces, the Flora of Afghanistan is decidedly peculiar.

Line of transition from Indian to Afghan Vegetation.—The transition commences, as may be said, along the Sutlege: on the Ferozepoor route it is gradual, on that of Shikarpore it is much more abrupt. At Peshawur, which is in north latitude 34° , and about 1200 feet above the sea, it is tolerably mature, still there is an intermingling of Indian species, and this continues, gradually becoming less, until one ascends to Gundamuk.

In Kutch Gundava, the Indian forms are less frequent; indeed it may be said that by the Ferozepoor route the Indian species encroach on the Afghan territory; in Kutch Gundava the Afghan species encroach on the Indian territory.

The Afghan transitional forms are various: Boraginæ, Reseda, Chenopodiæ, Bertholletia, Farselia, Medicago, Butomus, Peganum Harmali, Nerium oleander, Alhagi Marorum? The Indian transitional forms consist of Calotropis procera, certain Amaranthaceæ and Chenopodiæ, certain Saccharineous and Paniceous grasses, Acacia, Arabica, and pudica, Prosopis spicigera and Dalbergia Sissoo.

Proper comparison only with the Flora of the Levant, &c.—To gain a just idea of the Afghan Flora, we must compare it with that of the Levant, and perhaps with the greater part of the basin of the Mediterranean, with which it may be said to correspond in latitude. With the general Flora of Persia it may be regarded as continuous.

Extent of Mediterranean Province.—Few things can be more striking or worthy of comprehensive investigation than this vast extent of the Mediterranean or Australo-European Botanical province. Dr. Falconer told me, that he had ascertained it to prevail a long way to the northward and eastward of Afghanistan; and I have materials for shewing, that it characterizes the country on the N. face of the Paropamisus, between Maimuna and Bamean, and from the mission of Meyendorff to Bokhara, to which my attention was directed by Sir A. Burnes, it is evident that it equally characterizes Bokhara, and the country between it and Orenburgh.

On this subject, I shall enter into details in the purely botanical part of my report, which I shall have the honour of submitting with the arranged collection.

Features of the Afghan Flora.—The striking features of the Flora as compared with India, are the scarcity, generally amounting to absolute want, of indigenous trees, a general poverty in variety of form, the general prevalence of forms characteristic of Southern Europe, the abundance of the large European families, such as cruciferous, umbelliferous, &c. plants, and of those forms of Compositæ known to Botanists as Cynarocephaliæ, and of which thistles may be mentioned as familiar instances; the common occurrence of bulbous monocotyledonous plants, such as Tulips, Hyacinths, Onions, &c. the nature of its grasses, and the scarcity of Orchidæ and Ferns, which may be said to exist only in Eastern Afghanistan.

The number of aromatic plants, the prevalence of thorny species, and the very general occurrence of the flowering periods in the spring months, are also deserving of notice.

From almost all the forms being what are called European, it follows that no transition in form occurs consequent on variation of elevation, similar to that which has been so much noticed by all travellers in the Himalayas, and other high Indian ranges. In this we are accustomed to associate height with the appearance of forms familiar to our earlier days. In Afghanistan it is not so, and it is remarkable enough, that even the summer Floras of its lowest parts, which have as high a mean summer temperature perhaps as any in the world, are still characterised by a majority of European forms. In high or in low, in hot or in cold situations throughout Afghanistan, forms charac-

teristic of an European climate will be found to prevail. The traveller may pluck roses, pinks, hyacinths, sea-lavenders, kochias, eryngos, catchflies, flags, &c. at an elevation of 1,000 feet, as well as that of 10,000 feet. It would perhaps be difficult to find many generic forms characteristic of altitude.

Ordinary visitors would be likewise much struck with the circumstance, that a total change in the indigenous plants may exist, while there is little or none in those cultivated. Thus at Cabul, where the winter is so severe, and where heavy snow lies for two or three months, and about which not an indigenous plant, common to India perhaps is to be found, he will see Indian corn and rice cultivated with wheat and barley, rice perhaps forming the prevailing crop. We may see at Cabul the rice fields bordered by poplars and willows; the aspen quivering over the nodding rice. This is easily accounted for; an approach to community of temperature may perhaps be found between the summer heat of Cabul, and the winter and spring heats of the plains of India, which may explain the cultivation of wheat and barley. Between the summer heats of the two countries, there is likewise sufficient community to account for the cultivation of rice occurring in both in the summer.

Brief notices on useful Plants occurring wild.—The accompanying list will be found extremely meagre; but in the first place, the great bulk of the vegetation consists of the large European families, among which valuable products in the wild state are not extensively presented; and in the second, it is drawn up from memory chiefly, for even the casual overlooking of the Herbarium, which is requisite to make it more complete, would delay one considerably in the submission of the report, and I may add, there is no probability of valuable information turning up to compensate for this.

Maizurrye (Chamærops).—Among monocotyledonous plants, that of the most use is, I think, the *maizurrye*, of the Khyburs and Momunds. It is a small palm, and appears to be a *Chamærops*; perhaps the same as *C. humilis* of Southern Europe? Should it be distinct, I hope it may be allowed to bear the name of *C. Ritchiana*, after Dr. Ritchie, the only person who has explored the botanical productions of the Khybur Pass. This plant is extensively used in the manufacture of ropes, or strings for the bottoms of charpaiees,

and of the sandals, so universally worn in the Momund and Khybur districts, and perhaps generally throughout lower eastern Afghanistan.

Salep.—Salep is to be found in the markets of Cabul, at a much lower price than in those of the N. W. of India. A species of orchis is common in marshy places, high up among the Huzarah mountains, but I could not ascertain whether it was from this that Cabul was supplied. There is also an Eulophea in sand islands of the Koonur river, from which salep may be derived.

Umbelliferous Plants.—Among the dicotyledonous plants, the umbelliferous family holds perhaps the highest rank, as affording valuable wild products. In Afghanistan, most of the foetid, or aromatic foetid gum resins, such as opoponax, assafoetida, ammoniacum, sagapenum, will probably be found. Of these the most important is the assafoetida, as it is largely exported, and consumed in the country as an adjunct to cookery. It was first announced as existing in the country, I believe, by Sir A. Burnes; it appears to be of general occurrence on the hilly tracts. Probably it is furnished by two species. At Metah, Captain E. Conolly told me, it was produced largely in the hot country of Seistan. He also informed me, that it was collected in conical pieces of paper, placed over a complete section of the plant, at the junction of stem and root.

Prangos Pabularia.—As famous a plant as the assafoetida, exists in the Prangos pabularia. In Afghanistan, however, it certainly does not merit the reputation which Mr. Moorcroft has recorded it possesses in some parts of Thibet. This plant is not uncommon on the Hazarah mountains, at an elevation of 9,500 and 11,500 feet; but it is not used more, either as summer or winter fodder, than most of the plants possessed of any degree of succulence, of the same districts. It is as I have said, cut indiscriminately with thistles, docks, and a host of others, which would surprize an English farmer; this agrees generally with Dr. Falconer's experience.

Maimunna.—The Maimunna, a Rhamnaeous genus, is held in some esteem for its fruit, which for an uncultivated one, is by no means unpleasant. It is common throughout the lower parts of Eastern Afghanistan; the fruit is a black berry of the size of a black currant, and of sweetish flavor. A much more esteemed fruit, which

is sold commonly in the bazars, is the *Goorgoora*, *Edgeworthia buxifolia*, Fal. This plant was first found by Dr. Falconer about Peshawur, and by him was named after Mr. Edgeworth, a distinguished member of the Bengal Civil Service. Its natural characters are, as it were, intermediate between *Myrsionæ* and *Theophrastæ*, tending likewise towards *Sapotæ*. The fruit is roundish and succulent, about the size of a small marble; it is principally occupied by the seed, which is not eatable. I have not seen it fresh. It is considered heating by the Afghans, and this perhaps is the reason of its being common in the bazaars. The plant is generally a thorny shrub: it is common throughout the lower parts of the hills of Eastern Afghanistan.

Sinjit *Eleagnus orientalis*?—The Sinjit, which is probably the *Eloagnus orientalis*, ought perhaps to have been enumerated among the cultivated fruit trees; it is commonly planted along the banks of water-cuts; and is ornamental from its graceful crown and grey foliage. The dried pulp of the berry is eaten, but it is much too sour for European taste.

Pistacia, *P. Lentiscus*.—The *Pistacia* occurs, Lieut. Sturt tells me, on the Hindoo Koosh, to considerable extent; scattered plants of it are not uncommon throughout the mountainous parts of the country generally. It is a low tree, the seed constitutes the fruit, and is as much esteemed by the Afghans as almonds are by us.

Chilghozeh *Pinus*.—Edible seeds, of a very pleasant flavour, slightly tinged with turpentine, are yielded by the *Chilghozeh*, a species of Pine; the seeds are to all outward appearance exactly like those of the *Kunawur Pinus Gerardiana*. They are eaten in considerable quantities, the supplies being derived from the Sofaid Koh.

Umlook.—Another wild fruit is yielded by the *Umlook*, a species of *Diospyros*; it also occurs in some gardens; it is not worthy of any notice.

Schnee.—One of the most celebrated plants in the country for its aromatic and stimulant properties is the *Schnee*, which may perhaps be a species of *Balsamodendron*. It occurs in the Kojuck range, nad is to be met with, though not to such extent, on most others.

Rhuwath.—Another famous plant is the *Rhuwath*, or *Rhubarb*, which, as it is also cultivated and in great request, ought to have been arranged with the vegetables. It is the only instance which evinces

the knowledge of Afghans of the value of etiolating or blanching certain plants. I have never seen it, not having been in Cabul in the spring. The wild plant, which, I believe is the original of the cultivated one, is plentiful on the Kojuck range, and also on the Huzarah mountains up to an elevation of 11,500 feet. The leaves of this are used with others as winter fodder, the cultivated Rhubarb might easily be introduced to Simlah, Mussoorie, and Darjeeling.

Artemisia.—Several of the wild plants of Afghanistan are extensively used as fuel. Those in most common use about Cabul, are species of *Artemisia* or wormwood, by some of our officers known as wild thyme; they are aromatic, camphorated, low shrubs, and some are eaten by camels. In the loftier districts great part of the vegetable fuel is furnished by the plants known generally by the name of Koollah-i-Huzarah, Huzarah's Cap. They form one of the most prominent features of the Flora, occurring in dense, highly thorny, hemispherical tufts, as unpleasant to touch as the back of a hedgehog. Many species occur. To Botanists they are known by the name of *Statice*.

Ka-ri-Shootur.—*Alhagi Maurorum*.—Plants eaten by camels become, in such a barren country as Afghanistan, invested with a good deal of importance. Generally such are not deficient, but one of the difficulties of the Bolan Pass is occasioned by their absence, and to a similar cause I attribute the great loss of camels on the return to India between Bookhak and Bala Bagh. Of these the most esteemed is the *Ka-ri-Shootur*, or *Jaursa* of the N. W., one of the most widely distributed plants, occurring all over the N. W. of India, and all over Afghanistan, up to an elevation of 9,500 feet. This plant is also known as affording the *Turunjubeen*, a sort of manna-like substance; the production of this appears to be local, and the only place I was told it was procured in Afghanistan was the Candahar district.

Perhaps the best other kinds of camel fodder are furnished by the *Chenopodeæ*, or Goose-foot tribe. These abound throughout the country, and are succulent and saline.

Tragacanth.—There is every probability of the true *Tragacanth* plants being found in the country, the section being one of the most common forms of *Leguminosæ*.

Daphne.—A species of *Daphne* not unlike *D. Cannabina*; the paper plant of Nepal and Bootan, is not uncommon at elevations of 5,000

to 6,500 feet. The Afghans only make use of it in the construction of the matches for their match-locks.

Of the timber trees of Eastern Afghanistan an extensive use is not made; the Baloot suffers most, from being most accessible. The Zaitoon wood is remarkably heavy, sinking in water: it has a very close grain, and may be found to possess valuable properties. On the subject of forest trees, I have entered elsewhere.

PART IV.

It appears to me, that there are three natural defects, of more or less general occurrence, throughout Afghanistan, as that kingdom is now limited; viz. small portion of tillable soil. small proportion of tillable soil, want of forests, and of water-carriage. Afghanistan is, I think, decidedly a barren and poor country. The tillable part of the soil bears no proportion to that which is untillable.

The untillable majority is composed of either bare rock, the mountainous ranges for instance; or of the inclined planes of boulders and shingle, which I fear must be considered almost as irreclaimable as rock itself.

On the proportions of the tillable to the untillable part, I have no direct observations to adduce. Those proportions are variable, but very generally the irreclaimable parts are in vast excess,* and consequently they oppose a considerable obstacle to any such great extension of cultivation, as would entitle Afghanistan to be considered even a moderately rich agricultural country.

It was a common remark throughout the army, how wealthy the country would be, if stones were a source of richness and prosperity. The stony nature of the country is almost inconceivable by a person abtuated to the extensive alluvial soils of British India. It is still more striking, because, owing to the value of the tillable soil, all the roads, with but very few exceptions, are carried over the edge of the declivities; as an instance, and yet it is scarcely an extreme one, I may cite the county between Bala Bagh near Jelallabad, and Bookhak near Cabul, over which the great line of communication with the

* I annex a survey of the valley of Dhukka to shew the proportion of vast excess; the section of the Peshawur valley gives the opposite and more favourable one.

Punjab runs. This distance is scarcely less than 65 miles, and the stones are only varied by the occasional occurrence of patches of dry sand.

These stones and shingle are not merely strewed over the surface of these glacis slopes, but they constitute them entirely, and I do not exaggerate when I mention, that sections may be seen along the course of draining ravines, as much as 60 or perhaps 100 feet in depth.

But although these portions of the country do not appear adapted for any strictly agricultural purpose, there are considerable portions of some of the finer vallies still uncultivated, and it is to these that we must look for extension of cultivation. I shall merely mention such places as presented themselves to my observation; it would be useless to make any suggestions, for a great increase in cultivation has always, and rapidly, succeeded the accession of British supremacy.

Of these vallies I would beg particularly to direct attention to that of Pisbeen, in which, on the line of route of the army, I was surprised at seeing so little cultivation. This valley is, if not the largest, among the largest; its general altitude is perhaps 5,300 feet; it is drained by the river Lera, from which the application of the Persian wheel would draw ample supplies for irrigation. The valley is also worthy of examination as to the point of its applicability for a cantonment, instead of that of Quettah, which has, I hear, been found to be decidedly unhealthy. Its extent and openness are greatly in its favour.

When the army was at Candahar, a considerable amount of land both near the city and towards Deh Hajji was found uncultivated. The same remark also applies to the fine and elevated tracts between Mookoor and Nanee. But as in both these instances it was doubtless ascribable to a rapacious and unsteady Government, the tracts alluded to, must already have begun to shew evidences of great and permanent improvement.

PART V.

On contemplating the general resources of Afghanistan, in connection with its physical features, and nature of its inhabitants, it appears to me that there are two directions, which may possibly lead to positive and permanent improvement. I allude to Minerals and to Wool.

Minerals.—With regard to the former, I have to observe, that in the absence of coal, which does not appear to have been discovered, the mineral productions are only likely to become useful in the wooded parts of the country, that is, about the great ranges, Sofaid Koh and the eastern end of Hindoo Koosh, such for instance, as the Koonur and Bajore valleys.

On the subject of Minerals, I am not competent to afford any sound information, but I trust that in the prosecution of my experiment, the expence of land carriages, of labour, the general scantiness of streams, and perhaps their general inapplicability, may always be borne in mind.

If mines are ever worked at Taigea, the products will be chiefly limited to the supply of the Cabool markets, for, so far as my information goes, the Cabool river is not used for descent above Balabagh. This may possibly arise from prejudice on the part of the natives, and it may perhaps be considered worth while putting it to the test by means of a survey.

Bajore, I have always understood, to be deficient in streams. Forests of firs and oak doubtless exist on the ranges to the north of the valley, but whether so near to the mine as to be thoroughly applicable, remains to be discovered.

On the subject of minerals, generally, the remark may be made, that those of Afghanistan can only be expected to meet with a market in the country. India is I imagine independent in this respect, and to supply the European market appears to me a problematical assumption.

Wool.—It is to the wool of the country that I conceive especial attention should be paid: the material exists in great abundance, and trading in it will be in perfect unison with the habits of a great part of the Afghan population. A good deal will depend upon the time at which the best shearing takes place; this is stated by Captain Hutton to take place in the summer. If this is generally the case, the wool will be subjected to land-carriage from the higher districts to the lower. Captain Hutton states, that the winter shearings are reckoned inferior from the dirt occasioned by penning; but this scarcely applies to Eastern Afghanistan, throughout all the parts of which known to me, the flocks are in the autumn driven from the high to the low lands.

The great emigrations which thus take place towards Julalabad, will abstract a good deal of the wool, from additional expence of land-

carriage; the Cabool river being available to Peshawur, or to the Indus. What is first required, is an exact knowledge of its excellence, and the cost, inclusive of every charge, at which it can be delivered first at Bombay, finally in England.

If the properties of the wool be promising,* steps can be taken to improve the native breed by importation of the best foreign stocks. Improvement of wool is stated to depend primarily on attention to the breeds of Sheep, &c. It is also influenced by soil, climate, and food. It has been ascertained that fine clothing wool, the only one, judging from the dry climate, and pastures of Afghanistan, that can be chiefly looked for, may be grown equally fine in most situations, so that the sheep are confined and kept on dry food, a great part of the year. "It may also be grown on the richest pastures, provided these be overstocked to keep the herbage bare." It appears to me, but I beg it to be borne in mind, that I am no authority in such matters, that circumstances intermediate in some degree between dry food and rich pastures, are prevalent naturally throughout Afghanistan. It is also somewhat to the purpose to remark, that the climate of New South Wales is considered extremely favourable from its dryness and mildness, and that great advantage is derived from the absence of briars and underwood. The mildness, though not a feature of the Afghan climate, is obtained by the migrations I have alluded to, and the absence of briars and underwood is complete. The introduction of first rate rams is the main object at first: the offspring of the female appears to be always influenced by the first male with which it has had intercourse. It will be a matter of primary importance, therefore, to commence with best untried ewes and first-rate rams.

"By breeding from a coarse-woolled ewe and a pure fine-woolled ram, the produce of the first cross will have a fleece approaching one-half to the fineness of that of the ram; and by continuing to cross the progeny with a fine-woolled ram, equal to the first ram in quality, the fleece of the score and cross will approach three-fourths to the fineness of the first, and in a few crosses more will be brought to an equal quality." Breeding in and in must be strictly avoided. But by breeding from a coarse-woolled ram and a fine-woolled ewe, the series will be

* On this subject I have no direct knowledge. For the accompanying remarks, I am indebted to Rees' Cyclopædia.

reversed, and if continued, will be attended by the disappearance of the fine-woolled race.

I know nothing more likely to invite to improvement than the history of wool, nothing that should inculcate more steadily the advantages of interchange of breeds. Sheep's wool appears to be the product of cultivation; no wild animal is known resembling the wool-bearing sheep. The wild sheep of Afghanistan, and indeed all the wild animals of the same family in the country, are covered with short coarse hair of large diameters, under which, and next to the skin, occurs a various proportion of short wool. The effect of cultivation appears to be the falling off of the coarse hair, the place of which is supplied by the increased growth of the wool.

The fine wool equal to the best Merino, now produced exclusively in Australia is entirely owing to the skill and perseverance of a single individual, John MacArthur, Esq. His stock originally consisted of 30 coarse-haired Bengal ewes, but having in 1795 procured one Merino ram and two ewes from the Cape, he commenced crossing, and by constantly selecting the finest-woolled progeny for breeding from, he at length succeeded completely. In 1802 he came to England, and obtained certain advantages as rewards, he returned with three Merino rams and two ewes. In 1807, he possessed 7,000 sheep, and the better sort of this wool he sent to the English markets, was considered equal to the best Merino in every point, but cleanness.

I have to add, that the signs of fine clothing wools are fineness of fibre, softness, length, and soundness and equality of staple, (by which are meant the locks of aggregated fibres.) The colour should be pure white, and as the weight is materially influenced by cleanliness, this last is an object of great importance to the wool buyer.

Among the manifold ways by which Afghanistan may be made to benefit by its intimate connection with Great Britain, the introduction of useful plants, such as those adapted for timber, for food, or for other domestic purposes, is assuredly not the least in the scale. The plants most likely to succeed are perhaps those of Southern Europe. Some of the most important of those of Kunawur, might also be, I think, successfully introduced: with regard to these, I take the liberty of submitting the accompanying list, premising, that it is drawn up on general considerations, not strict practical knowledge.

List of useful and ornamental Arborescent or Shrubby Plants, adapted to the middle regions of Afghanistan.

Botanical Names.	Native Country.	Uses.
<i>Quercus Robur</i> , W. ...	Britain, ...	Timber, tanning and dyeing.
" <i>Hex</i> , W. ...	S. France, ...	Timber.
" <i>Suber</i> , W. ...	S. France, Spain, ...	Cork-Bark.
" <i>Asculus</i> , W. ...	S. Europe, ...	Edible Seeds.
" <i>Virens</i> , Ph. ...	N. America, ...	Excellent Timber.
" <i>Cerris</i> , W. ...	S. Europe, ...	Timber, very ornamental.
<i>Castanea Vesca</i> , W. ...	S. Europe, ...	Timber and fruit, Spanish Chesnut.
<i>Ostrya Vulgaris</i> , W. ...	Italy, ...	...
<i>Carpenus orientalis</i> , W. ...	Levant, ...	...
<i>Fagus sylvatica</i> , W. ...	England, &c. ...	...
<i>Corylus Avellana</i> , W. ...	Europe, ...	Ornamental, and variously useful.
<i>Liquidambar styraciflua</i> , ...	N. America, ...	Variouly useful, Hazelnuts.
<i>Platanus occidentalis</i> , W. ...	N. America, ...	Timber and Gum.
<i>Alnus glutinosa</i> , W. ...	Europe, ...	Timber, ornamental.
" <i>oblongata</i> , W. ...	S. Europe, ...	Timber.
<i>Betula alba</i> , W. ...	Britain, ...	Timber.
" <i>pendula</i> , North, ...	Europe, ...	Ornamental.
" <i>populifolia</i> , W. ...	N. America, ...	Timber.
" <i>papyracea</i> , W. ...	N. America, ...	Timber.
" <i>Cuta</i> , W. ...	N. America, ...	Excellent Timber.
<i>Salix alba</i> , W. ...	Europe, ...	...
" <i>viminialis</i> , W. ...	" " ...	These species of Willow variously useful, as
" <i>stipularis</i> , W. ...	England, ...	timber, or more especially for basket-work.
" <i>Fortyana</i> , W. ...	Britain, ...	...
" <i>rubia</i> , W. ...	England, ...	...

List of useful and ornamental Arborescent or Shrubby Plants, adapted to the middle regions of Afghanistan.

Botanical Names.	Native country.	Uses.
<i>Populus alba</i> , W.	Britain,	Wood for turning.
" tremula, W.	Ditto,	Ditto for ditto.
" nigra, W.	Britain,	Wood for turning.
" dilatata, W.	Italy,	Timber.
<i>Ulmus glabra</i> , W.	Britain,	} Timber.
" Campestris, E.B.	Palestine,	} Timber.
<i>Celtis Australis</i> , W.	S. Europe,	Timber.
<i>Juglans alba</i> , W.	N. America,	Timber and edible nuts.
" nigra, W.	Ditto,	Ditto ditto.
" sulcata, W.	Ditto,	} Ditto Hickory of America.
" glabra, W.	Ditto,	} Ditto and edible nuts.
<i>Salisburia adiantifolia</i> , ..	Japan,	Fruit.
<i>Pinus Longifolia</i> , W.	Sub-Himalyas,	Timber, Tar, Rosin.
" Laricio, P.S.	Corsica,	Timber.
" Pinaster, W.	S. Europe,	Ornamental.
" Pinea, W.	S. Europe,	Ditto. edible seeds.
" Canariensis, Buel,	Canaries,	Timber.
" Gerardiana,	Kunawur,	Ornamental.
<i>Abies picea</i> , W.	Germany,	
" Orientalis, W.	Levant,	
" Larix communis, Sal,	Germany,	Excellent Timber.
<i>Cedrus Libanotis</i> , Barr,	Levant,	Ornamental.
" Deodara,	Himalyas,	Ditto, excellent Timber.
<i>Cupressus tomosa</i> ,	Ditto.	Ornamental.
" <i>Taxus baccata</i> , W.	Europe,	Timber, the Yew tree.

List of useful and ornamental Arborescent or Shrubby Plants, adapted to the middle regions of Afghanistan.

Botanical Names.	Native country.	Uses.
<i>Buxus sempervirens</i> , W.	Europe, Levant,	Variously useful Box.
<i>Stillingia sebifera</i> , W...	China,	Gives tallow,
<i>Acer Pseudoplatanus</i> ,	Austria, Italy,	Timber.
" <i>Opalus</i> , W.	Italy,	Very ornamental,
" <i>platanoides</i> , W.	Europe,	Very ornamental.
<i>Æsculus Hippocastanea</i> ,	Asia,	Variously useful.
<i>Tilia intermedia</i> , Heque,	Britain,	} Linden or Lime trees, variously useful.
" <i>rubia</i> , Dec.	Europe,	
<i>Ilex Aquifolium</i> , W.	Europe,	
" <i>diphyrena</i> , Wab.	Himalyas,	Ornamental, for hedges, &c.
<i>Rhamnus infectoria</i> , W.	S. Europe,	Ditto.
" <i>alatus</i> , W. ea.	Ditto,	Ornamental.
<i>Olea Europea</i> , W.	S. Europe,	Olive, said not to flourish far from the sea.
<i>Ligustrum vulgare</i> , W.	Europe,	The Privet, adapted for hedges.
<i>Syringa vulgaris</i> , W.	Persia,	} Ornamental Lilacs.
" <i>persica</i> , W.	Ditto,	
<i>Omus Europœa</i> , P.S.	Italy,	
<i>Fraxinus excelsus</i> , W.	Europe,	Yields the Manna of commerce.
<i>Styrax Officialis</i> , W.	Italy, Levant,	Ash, variously useful.
<i>Ceratonia Siliqua</i> , W...	Levant,	Yields Storax.
<i>Robinia Pseudoacacia</i> , W.	N. America,	Edible Seeds.
<i>Ulex Coropœas</i> , W.	Britain,	Timber.
<i>Cytisus Laburnum</i> , W.	Switzerland,	Furze, ornamental.
" <i>Alpinus</i> , Wen.	Europe,	Laburnum, ornamental.
		Ditto, Timber.

Herbaceous Plants.

Botanical Names.	Native Country.		Uses.
<i>Anchusa tinctoria</i> , W....	...	S. Europe, ...	... Yields a red dye.
<i>Digitalis purpurea</i> , S.	Europe, ...	... Foxglove, medicinal.
<i>Trifolium repens</i> , W.	Europe, ...	... Most valuable as an artificial grass, (Clover).
<i>Hedysarum Onobryches</i> , W.	Europe, ...	... Saintfoin, an excellent artificial grass, may be tried on the glacis and slopes.
<i>Liquoritia Officialis</i> , Monel,	S. ditto, ...	... Yields the Liquorice of commerce.
<i>Colechicum autumnalis</i> , W.	Europe, ...	... Medicinal,
<i>Ipomea Jalapa</i> ,	Mexico, ...	... Yields the Jalap, which requires a cool and dry climate.
<i>Humulus Lupulus</i> ,	Europe, ...	... Yields the Hop of commerce.

Several of the European fruits may also be introduced with benefit, such as currants, raspberries, strawberries.

Of vegetables, the artichoke, parsnip, carrot, turnip, potatoes, horse radish, celery, sea kale, asparagus, parsley, good lettuces, endive, are desiderata; some of them exist indigenously, but cultivated kinds are required.

For the more tropical parts of the country, I would recommend the introduction (or extension) of the Sissoo, Series, Jamin, the Mhowa, Toon, Mangoe, and Kikkur.

The list might be extended almost indefinitely. I have taken my authority for most of the plants adapted to the middle regions, by which may be meant all between 3,000 and 7,500 feet, from Loudon's *Encyclopædia*, which book is also my authority for the properties of the species. With regard to the North American plants, detailed information is required, the habitats given by Mr. Loudon embracing half of the new world.

Among these proposed introductions, the hop will be found. In a conversation with Dr. Falconer, it was suggested to me, that the Afghan climate, from its dry summer, would probably be well adapted to the cultivation of this plant. I in return suggested that the fine tracts between Mookloor and Ghuzni, the valleys about Cabul and Kohistan generally, would seem to be the most promising sites. I would not now omit Candahar. I think that with regard to climate, Afghanistan appears to present most, if not all, the circumstances under which the hop reaches perfection in England; and I also think, that the experiment should be tried. Mr. Loudon says, in his *Encyclopædia of plants*, that the expences of a hop plantation are very great. But I do not think that considerations of this kind, except where the expence is unreasonable, are to be taken into so much weight when connected with useful proposals recommended to a powerful Government. Even putting the question into the shape of pounds, shillings, and pence, great direct returns might be expected in the increased duration of life among the European soldiery in India, to say nothing of the enormous indirect advantage the army would derive from that increase of sobriety, likely to attend the substitution of good beer, for noxious ardent spirits. Excellent practical information regarding the hop is to be found in the *Penny Cyclopædia*, vol. xii. and I would

suggest, that the article alluded to, should dictate the line of operations, should the experiment be sanctioned by Government.

The same manure which in Flanders frequently ensures very large returns, will not be difficult to procure, and may with much greater cleanliness be used for the improvement of this plant, than in the baking of bread, or heating of baths.

Cochineal. I must not pass over a product of the animal kingdom, which though not indigenous to Afghanistan, is to Central Asia. I allude to the Cochineal, to which attention was first drawn by Sir A. Burnes, in his adventurous journey to Bokhara. This same distinguished officer obligingly furnished me with samples of the Asiatic product and that of America, derived from Russian commerce. He also sent me specimens of a leguminous shrub on which the insect is said to feed, and which is indigenous to Afghanistan. I could not detect any difference between the two articles, either in their appearance or the colour of their infusion. The subject is worth enquiring into; for my own part, I could not but apprehend that some mistake has occurred, and that the Asiatic insect, of whatever nature its colouring matter may be, will be found to differ in more material points from the American one.

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Observations for Latitude from Mer. Altitudes of the Sun or Stars.

Date.	Station.	Heavenly body.	Observed Altitude.	Ref.	Barometer.	Therm.	REMARKS.
1839.							
March 2.	Bagh,	..	89°	25	29.810	65	
"	Ditto,	ε Canis Majoris,	64.30.10	25	"	"	h. m.
"	Ditto,	⊙	107.23.40	40	29.848	10.5°	Assumed E. Long. 4-32.
" 3	Ditto,	..	89.	"	29.770	70	
"	Ditto,	Sirius,		"	"	"	
" 4	Ditto,	ε Canis Majoris,	64.29.40	"	"	"	Mean Latitude 29°-1'-20"
"	Mysoor,	β Ursæ Minoris,	88.29.00	"	29.800	55	
"	Ditto,	Sirius,	88.41.20	20	29,700	70	
"	Ditto,	ε Canis Majoris,	64.11.15	"	"	"	h. m.
"	Ditto,	⊙	108.35.50	"	29,807	10.0	Assumed Long. E. 4-32.
" 5	Ditto,	..	88.41.15	"	29.685	70	
"	Ditto,	Sirius,		"	"	"	
"	Ditto,	ε Canis Majoris,	64.11.10	"	"	"	
" 6	Ditto,	β Ursæ Minoris,	88.48.50	"	29,700	65	
"	Nowshera,	..	88.18. 5	29.2	29,650	70	} Mean Lat. 29°-22'-15,"8.
"	Ditto,	Sirius,	63.47.40	"	"	"	
"	Ditto,	ε Canis Majoris,	108.59.50	"	"	95	
"	Ditto,	⊙	89.10.50	83	"	60	h. m.
" 7	Ditto,	β Ursæ Minoris,		"	"	90	Assumed Long. E. 4-30.
"	Dadur,	⊙	109.33.40	"	29,438	"	
" 8	Ditto,	⊙	110.20.50	"	29,372	"	
" 11	Ditto,	β Ursæ Minoris,	89.23.20	25	29,300	95	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
March 11.	Dadur,	Antares, ☉	68.58.10	25	29.300	95	
" "	Drubhee Bolan Pass,	"	112.40.	"	29.406	80	
" 12	Drubhee Bolan Pass,	β Ursæ Minoris,	89.23.15	"	" "	60	
" "	8 Miles into Bolan Pass,	☉	113.28.25	20	29.210	85	
" 13	Ditto,	Antares,	68.57.55	"	29.200	56	
" "	Ditto,	Saturn,	80.48.35	"	" "	"	
" "	Gurmab,	☉	114. 1.45	"	29.003	85	Cloudy.
" 14	Ditto,	☉	114.49.20	"	28.995	"	
" 15	Ditto,	β Ursæ Minoris,	89.36.40	"	29.000	60	
" "	Ditto,	Antares,	68.44.15	"	" "	"	
" "	Ditto,	Saturn,	80.34.40	20	" "	"	
" 16	Beebe Nancee,	Antares,	68.31.30	"	28.350	51	
" "	Ditto,	Saturn,	80.22.45	"	" "	"	
" "	Abigoom,	☉	115.56.50	"	27.603	74	
" "	Ditto,	α Hydræ,	104.29.50	"	27.518	63	
" 20	Munzil Dust-i-be,	Hydræ,	104.16.45	20.5	24.500	34	
" "	Dowlut,	☉	119.41.20	"	" "	62	
" "	Ditto,	Hydræ,	104.16.35	40.8	" "	46	
" 24	Siriah,	Ditto,	103.54.45	"	24.600	50	
" 25	Quetta,	Ditto,	103.41.45	"	24.700	48	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Baromet.	Therm.	REMARKS.
1839.							
March 29.	Quetta,	..	103.41.20	40.8	24.700	42	h. m.
" 30	Ditto,	☉	126. 9.25	"	0.720	75	Assumed Longitude 4-15.
" "	Ditto,	..	103.41.30	"	0.700	46	
" 30	Ditto,	☉	115.14.00	"	"	42	
" 31	Ditto.	☉	127.18.56	41	"	85	Doubtful observation.
April 2d.	Ditto,	☉	103.14.30	40.8	0.730	55	Mean Latitude.
" "	Ditto,	..	128.28.30	"	"	85	Quetta, 30° 12' 52" 8.
" "	Ditto,	..	115.13.45	"	"	57	
" 6	Ditto,	..	115.14.50	"	"	46	
" 8	Hydrozye,	☉	103. 9.	"	25.100	61	Hurried observation.
" "	Ditto,	☉	115.46.45	43	"	58	
" 9	Hykulzye,	..	102.52.20	"	25.200	55	
" "	Ditto,	..	116. 3.10	"	"	50	
" 10	Berumbye,	☉	102.40.55	"	24.700	65	
" 11	Kojhuck Pass,	☉	102.25.35	"	23.600	60	
" "	Ditto,	☉	116.29.30	"	"	55	
" 13	Choky,	☉	116.31.20	31	24.720	55	
" 14	Ditto,	☉	116.31.50	"	"	66	
" 20	Dundi Goolai,	☉	102. 9.45	"	26.200	75	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
April 21	Kila Putoola,	...	116.27.40	31	26.200	75	Doubtful.
" 24	Dai Haj,	...	117.37.33	40	26.500	80	
" 28	Candahar,	...	118. 0.50	1.27	26.550	70	
" "	Ditto,	β Corvi,	71.52.55	"	" "	"	
" 30	Ditto,	...	117.58.40	"	26.600	75	Hurried observation.
" "	Ditto,	β Corvi,	71.52.00	"	" "	70	
" "	Ditto,	Jupiter,	111.17.00	"	" "	"	
" "	Ditto,	Spica,	96.13.25	"	" "	"	
" "	Ditto,	Dubhe,	118. 0.10	1.17	26.660	75	
May 2nd.	Ditto,	β Corvi,	71.22.25	"	0.650	"	
" "	Ditto,	...	111.25.10	"	" "	"	
" "	Ditto,	Jupiter,	96.14.20	1.175	26.650	72	
" "	Ditto,	Spica,	71.53.30	"	" "	78	
" 3	Ditto,	β Corvi,	111.30.00	"	" "	"	
" "	Ditto,	Jupiter,	96.14.40	"	" "	75	
" "	Ditto,	Spica,	71.52.40	"	" "	"	
" 5	Ditto,	β Corvi,	111.37.30	"	" "	72	
" "	Ditto,	Jupiter,	96.14.10	"	" "	70	
" "	Ditto,	Spica,	96.15.00	12.8	" "	75	
" 15	Ditto,	... ..	93.37.25	1.31.6	" "	80	
" 3	Ditto,	β Ursæ Minoris,	...		" "		

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
June 3	Candahar,	... β Libræ,	99.19.55	1.9	26.650	80	
" 10	Ditto,	... α Libræ,	86. 8.45	"	"	70	Hurried observation.
" "	Ditto,	... β Ursæ Minoris,	93.37.45	"	"	70	
" 11	Ditto,	... α Libræ,	86. 8.30	1.19.2	"	70	
" "	Ditto,	... β Ursæ Minoris,	93.37.30	"	"	"	
" "	Ditto,	... β Libræ,	99.19.25	"	"	"	
" 12	Ditto,	... β Libræ,	86. 9.00	"	"	64	
" "	Ditto,	... α Ursæ Minoris,	93.37.10	"	"	"	
" "	Ditto,	... β Libræ,	99.18.50	"	"	"	Mean Latitude.
" 13	Ditto,	... α Libræ,	86. 9.00	"	"	70	Candahar, 31°35'19".
" "	Ditto,	... β Ursæ Minoris,	93.36.00	"	"	"	
" "	Ditto,	... β Libræ,	99.18.10	"	"	"	
" 15	Ditto,	... β Ursæ Minoris,	93.37.40	"	"	62	
" "	Ditto,	... β Libræ,	99.18.40	"	"	62	
" 16	Ditto,	... α Libræ	86. 8.50	1.25	"	"	
" "	Ditto,	... β Ursæ Minoris,	93.37.00	"	"	70	
" 17	Ditto,	... β Libræ,	99.18.50	"	"	"	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
June 17	Candahar,	... α Librae,	86. 8.25	1.25	26.650	70	
" 18	Ditto,	... β Ursæ Minoris,	93.37.30	"	"	"	
" "	Ditto,	... β Librae,	99.18.25	"	"	"	
" "	Ditto,	... β Librae,	86. 8.00	"	"	"	
" 19	Ditto,	... β Ursæ Minoris,	93.36.30	"	"	80	Hot Westerly winds.
" "	Ditto,	... α Librae,	99.18.45	"	"	"	
" "	Ditto,	... β Librae,	86. 7.50	"	"	"	
" "	Ditto,	... β Scorpii,	78. 9.40	"	"	"	
" "	Ditto,	... Antares,	64.45.20	"	"	"	
" 20	Ditto,	... β Scorpii,	78. 9.30	"	"	"	
" 22	Ditto,	... β Draconis,	78. 9.30	"	"	"	
" "	Ditto,	... β Cephei,	119.28.20	"	"	"	
" "	Ditto,	... β Cephei,	103.31.45	"	"	72	
" 23	Ditto,	... Draconis,	119.28.50	"	"	78	
" 24	Ditto,	... β Cephei,	103.32.45	"	"	"	
" "	Ditto,	... α Cephei,	119.25.20	"	"	70	
" 28	Kolah-i-Azeem,	... β Librae,	99.10.25	1.5	26.240	85	
" "	... ..	... β Ursæ Minoris,	93.44.40	"	"	"	Hurried observation.

Observations for Latitude from Mer. Altitudes of the Sun or Stars, — (continued.)

Date.	Station.	Heavenly body.	Observed Altitudes.	Error.	Barometer.	Therm.	REMARKS.
1839.							
June 29	Turnukur. Khail-i-Akhoon.	... } β Ursæ Minoris,	93.53.00	1.5	25.858	80	
" "	" "	... } β Libræ,	99. 2.35	"	" "	"	
" 30	Shair-i-Suffa,	... } β Ursæ Minoris,	94. 2.30	"	25.668	"	
" "	" "	... } β Libræ,	98.52.30	"	" "	"	
July 1st.	Near Tirandaz,	... } β Ursæ Minoris,	94. 9.40	"	25.500	80	
" "	" "	... } β Libræ,	98.45.20	"	" "	"	
" 2	Toot,	... } β Ursæ Minoris,	94.18.40	"	25.300 assd.	80	
" "	" "	... } β Libræ,	28.36.40	"	" "	"	
" 4	Kholah-i-Giljee,	... } β Scorpionis,	77. 5.45	"	24.700	75	
" "	" "	... } β Draconis,	120.33.30	1.0	" "	"	Indifferent.
" 5	" "	... } β Libræ,	98.14.00	"	" "	80	Mean Latitude.
" "	" "	... } β Scorpii,	77. 5.10	"	" "	78	Kelat-i-Ghilzie.
" "	" "	... } β Draconis,	120.32.10	"	" "	76	32° 7' 24."
" "	" "	... } δ Ophiuchi,	109.14.50	"	" "	"	
" 6	Sir-i-Asp,	... } β Scorpii,	76.55.50	"	24.500	70	
" "	" "	... } δ Ophiuchi,	109. 5.35	"	" "	"	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Latitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
July 6	Sir-i-Asp,	..	120.42.40	1.0	24.500	70	
" 9	Shuftul,	..	121. 9.20	"	24.050	75	
" "	"	..	108.40.00	"	"	"	
" 11	Chushni Sair,	..	76.17.10	"	23.950	75	Cloudy.
" "	"	..	62.52.20	"	"	"	bright.
" "	"	..	108.27.20	"	"	"	rather cloudy.
" 12	Ghojan,	..	121.46.00	53.7	23.600	73	very windy.
" "	"	..	108. 1.35	"	"	"	"
" 13	Mookloor,	..	107.47.50	"	23.570	70	Hurried.
" 14	"	..	122.00.00	"	"	"	Mean Latitude.
" "	"	..	75.37.30	"	"	73	Mookloor,
" "	"	..	107.46.50	"	"	"	30° 51' 27."
" 15	"	..	121.59.50	"	"	"	
" 16	Oba,	..	107.29.00	"	23.400	70	
" "	"	..	122.19.45	"	"	"	
" 17	Jumrat,	..	75. 4.00	1.	23.300	75	
" "	"	..	75.27.35	"	"	"	
" 18	Near Karabagh,	..	107. 3.00	"	23.435	71	Cloudy and hazy.

Observations for Latitude from Mer. Altitude of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Latitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
July 18	Near Karabagh, ..	β Draconis,	122.45.10	1.9	23.435	71	
" 20	Nanee Mills,	β Scorpii,	74.31.00	"	23.336	76	
" "	" "	δ Ophiuchi,	106.41.30	"	" "	"	
" "	" "	β Draconis,	123. 5.40	"	" "	"	
" 25	Ghuzni,	ξ Cephei,	93.43.20	1.18	23.000	63	
" 26	" "	β Draconis,	123.25.45	1.42	" "	75	
" "	" "	Saturn,	74.37.00	"	" "	"	Mean Latitude Ghuzni,
" 27	" "	α Cephei,	123.23.10	"	" "	66	33° 34' 27"
" "	" "	β Cephei,	107.29.20	"	" "	"	
" "	" "	Saturn,	74.37.00	"	" "	78	
Aug. 1st.	Hyder Khail,	Fomathaut,	51.12.35	1.7	23.160	60	Observations thus far made
" "	" "	β Cephei,	94.32.15	"	" "	"	with a Gilbert's sextant,
" 2	Shaikabad,	δ Aquilæ,	117.27.40	"	23.360	73	6 inches radius, of his
" "	" "	α Aquilæ,	128.45.10	"	" "	"	usual workmanship.
" "	" "	α Capricorni,	85.49.25	"	" "	"	
" 11	Cabul,	δ Aquilæ,	116.37.20	32	24.200	75	
" 11	Baber's Tomb,	α Aquilæ,	127.54.30	"	" "	"	Observations from this made with a well furnished 6 ins. radius sextant of Troughton and Si- mons,
" 13	" "	α Cephei,	125.12.40	"	" "	70	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Aug. 13	Baber's Tomb,	.. β Aquarii,	98.26.40	32	24.200	70	} Hurried Observations. Both instruments were divided to 10"
" "	" "	.. β Cephei,	109.18.45	"	" "	"	
" "	" "	.. ϵ Pegasi,	129.16.35	"	" "	"	
" "	" "	.. α Aquarii,	108.48.55	"	" "	"	
" 15	" "	.. α Cephei,	125.12.40	27.7	" "	65	
" "	" "	.. β Aquarii,	98.28.10	"	" "	"	Gilbert's Sextant.
" "	" "	.. β Cephei,	109.21.25	1.15	" "	"	
" "	" "	.. ϵ Pegasi,	129.16.55	27.7	" "	"	
" "	" "	.. α Aquarii,	108.49.00	"	" "	"	
" "	" "	.. α Cephei,	125.13.00	"	" "	"	
" 17	" "	.. β Cephei,	109.19.10	"	" "	"	
" "	" "	.. ϵ Pegasi,	129.17.15	"	" "	"	
" "	" "	.. α Aquarii,	108.49.00	"	" "	"	
" "	" "	.. ..	108.49.10	18	" "	"
" 8	" "	.. α Cephei,	125.12.30	"	" "	"	
" "	" "	.. δ Pegasi,	130.59.40	"	" "	"	
" "	" "	.. Fomathaut,	50. 7.00	"	" "	63	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Aug. 19	Baber's Tomb,	.. δ Aquilæ,	116.36.20	43.3	24.200	70	
" "	" "	.. α Aquilæ,	127.54.20	"	" "	75	
" 20	" "	.. β Ceti,	73.17.55	"	" "	73	
" "	" "	.. β Cephei,	109.19.15	18	" "	65	
" "	" "	.. ϵ Pegasi,	129.17.20	"	" "	"	
" "	" "	.. Polaris,	72. 9.10	"	" "	58	
" "	" "	.. Ceti,	93. 0.10	"	" "	58	
" 21	" "	.. α Aquilæ,	127.54.15	"	" "	70	
" "	" "	.. δ Aquilæ,	116.36.30	"	" "	"	
" 28	Yourtt,	.. α Aquilæ,	187.58.40	27	20.8.30	48	
" "	" "	.. \odot	129.45.30	"	" "	70	Long. Assd. 4h. 33m. 20s. E.
" 29	" "	.. δ Aquilæ,	116.41. 5	"	20.826	48	
" "	" "	.. α Aquilæ,	127.58.40	"	" "	"	
" "	Shah Sung,	.. δ Aquilæ,	116.27.30	"	20. 9	44	
" "	" "	.. α Aquilæ,	127.45.35	"	" "	"	
" 31	Kaloo,	.. δ Aquilæ,	116.18.30	"	20. 6	44	
" "	" "	.. α Aquilæ,	127.36.10	"	" "	"	

Observations of Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839. Sept. 1	Sooktah,	.. δ Aquilæ,	116.12.20	30	21.410	50	
" "	" "	.. α Aquilæ,	127.30.30	30	" "	"	
" "	Topchee,	.. δ Aquilæ,	116.4.15	40	22.000	56	
" "	" "	.. α Aquilæ,	127.21.40	"	" "	"	
" "	Bamean,	.. δ Aquilæ,	115.57.55	33	22.830	50	
" "	" "	.. α Cephei,	125.51.20	"	" "	46	
" "	" "	.. β Aquarii,	97.49.40	"	" "	"	
" "	" "	.. ϵ Pegasi,	128.38.50	"	" "	"	
" "	" "	.. α Aquarii,	108.11.10	"	" "	"	
" "	" "	.. \odot	124.41.40	"	22.460	100	Long. Asd. 4h. 33m. E.
" "	" "	.. δ Aquilæ,	115.57.50	"	" "	50	
" "	" "	.. α Aquilæ,	127.16.00	"	" "	"	
" "	" "	.. α Cephei,	125.51.00	"	" "	46	Mean Lat.
" "	" "	.. β Aquarii,	97.50.00	"	" "	"	Bamean 36° 49' 11".
" "	" "	.. ϵ Pegasi,	128.39.30	"	" "	"	
" "	" "	.. α Aquarii,	108.11.30	"	" "	"	
" "	" "	.. \odot	123.57.30	"	" "	100	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Baromet.	Therm.	REMARKS.
1839.						
Sept. 6	Trohawk,	.. δ Aquilæ,	115.58.10	33 22. 7	58	
" "	" "	.. α Aquilæ,	127.15.40	" "	"	
" 7	Erak,	.. ☉	122.28.40	31 22.130	46	
" 9	Kurząd,	.. δ Aquilæ,	116.19.15	" 20. 57	42	
" "	" "	.. α Aquilæ,	127.36.50	" "	"	Cloudy.
" 10	Girdun Dewar,	.. ☉	120.51.00	32 21. 2	90	
" 12	Ciri Chushon,	.. δ Aquilæ,	116.44.40	" 22. 2	54	
" "	" "	.. α Aquilæ,	128. 2.35	" "	"	
" 13	Jubraz,	.. ☉	118.38.10	22.760	98	
" 14	Kote-i-Ashruf,	.. ☉	117.55.20	23.109	"	
" 15	Urghundi,	.. ☉	117. 6.20	23. 26	100	
" "	" "	.. δ Aquilæ,	116.40.25	" "	65	
" "	" "	.. α Aquilæ,	127.58.20	" "	"	
" 16	Topchee Bashee,	.. δ Aquilæ,	116.36.40	23.	"	
" "	" "	.. α Aquilæ,	127.54.35	" "	"	
" 20	Cabul,	.. α Cephei,	125.13.10	24. 14	65	
" "	E. side in Camp,	.. α Aquarii,	108.49.40	" "	"	
" 21	" "	.. ☉	112.23.20	" "	100	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed, Latitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Sept. 21	E. side in Camp, ..	α Aquilæ,	127.54.10	27	24. 14	65	
" "	"	" α Cephei,	125.13. 5	"	" "	"	
" "	"	" β Cephei,	109.19.35	"	" "	60	
" "	"	" ϵ Pegasi,	129.17.25	"	" "	"	
" 22	"	"	111.35.50	30	" "	98	
" 23	Cabul,	"	110.49.20	"	" "	"	
" 24	"	"	110. 2.45	"	" "	"	
" 25	"	"	109.16.00	"	24. 24	"	
" 28	"	"	106.54.55	"	24. 14	"	
" 30	"	"	105.21.45	18.7	24.300	"	
Oct. 1.	"	"	104.34.40	"	" "	105	
" 2	"	"	103.48.15	"	24.316	"	
" 3	"	"	103. 2.00	"	24. 35	"	
" 5	"	"	94.15.00	"	" "	40	
" "	"	Rigel,	103.24.60	"	" "	"	
" "	"	ϵ Orionis,	125.45.35	"	" "	"	
" "	"	Betelgeux,	101.29.00	"	" "	110	
" 6	"	"	100.42.50	"	" "	105	
" 7	Boothah,	"	100. 9.25	"	24. 3	90	
" "	Khoosd Cabul,	"	99.22.00	"	23.293	"	
" 8	Talzeen,	"		13	24. 05	"	

Oct.

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Oct. 12	Jugdulluck,	.. α Cephei,	125. 4.10	16	25.100	60	
" "	" "	.. β Cephei,	109.10.40	"	" "	"	
" "	" "	.. β Pegasi,	129.25.40	"	" "	"	
" 13	Soorkhab,	.. β Aquarii,	98.48.20	"	25. 9	60	
" "	" "	.. α Cephei,	124.53.10	"	" "	"	
" "	" "	.. ϵ Pegasi,	129.37.00	"	" "	"	
" "	" "	.. α Aquarii,	109. 8.50	"	" "	"	
" 14	Gundamuck,	.. α Cephei,	95. 3.45	22	25. 7	100	Mean Lat.
" "	" "	.. β Cephei,	124.46.45	"	" "	56	Gundamuck $34^{\circ} 17' 36''$ 8.
" "	" "	.. ϵ Pegasi,	108.53.20	"	" "	"	
" "	" "	.. α Aquarii,	129.43.00	"	" "	"	
" "	" "	.. α Aquarii,	109.15.25	"	" "	"	
" 16	Futtehabad,	.. α Cephei,	93.27.00	18	27. 05	106	Long. Assd. 4h. 41m. E.
" "	" "	.. β Cephei,	124.53.30	"	" "	52	
" "	" "	.. ϵ Pegasi,	109. 0.30	"	" "	"	
" "	" "	.. α Aquarii,	129.36.00	"	" "	"	
" "	" "	.. α Aquarii,	109. 7.50	"	" "	"	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Oct. 17	Futtehabad,	..	92.42.50	15	27.106	96	
" 18	" "	..	124.53.40	"	"	58	
" "	" "	..	109. 0.15	"	"	"	
" "	" "	..	129.36.00	"	"	56	
" "	" "	..	109. 8.00	"	"	"	
" 19	" "	..	91.15. 5	"	27. 17	85	
" 20	Sultanpore,	..	90.24.40	54.2	27. 96	98	
" "	" "	..	124.59.25	44+	"	58	
" "	" "	..	109. 6.20	"	"	"	
" "	" "	..	129.28.20	"	"	"	
" "	" "	..	89.39.15	28.5+	28. 2	104	
" 21	Julalabad,	..	125. 1.15	"	"	56	
" "	" "	..	109. 8.00	"	"	"	
" "	" "	..	129.26.20	"	"	"	
" "	" "	..	94.23.50	"	"	48	
" 22	" "	..	125.54.15	"	"	"	
" "	" "	..	78.11.40	"	"	44	
" "	" "	..	88.55.50	47.5+	28. 15	106	
" "	" "	..	108.57.50	"	"	60	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Oct. 22.	Jelalabad,	.. Fomalhaut, ☉	50.16.00	47.5+	28.15	60	Mean Lat. Jelalabad, 34° 25' 5"
" 23	" "	.. α Aquarii,	88.13.55	45+	28.211	106	
" "	" "	.. ζ Pegasi,	103.58.35	"	"	56	
" "	" "	.. Fomalhaut,	131. 9.30	"	"	"	
" 24	" "	.. β Cephei, ☉	50.16.00	"	"	"	
" 25	" "	.. α Aquarii,	87.31.00	54+	"	110	
" "	" "	.. β Cephei,	86.49.40	50+	28. 2	107	
" "	" "	.. α Aquarii,	109. 7.20	"	"	60	
" "	" "	.. Rigel,	108.57.30	"	"	"	
" 26	" "	.. ε Orionis,	94.23.40	"	"	45	
" "	" "	.. Bebelgeux,	108.33.00	"	"	"	
" "	" "	.. Sirius,	125.54.15	"	"	"	
" "	" "	.. Procyon,	78.11.20	"	"	"	
" "	" "	.. ☉	122.25.30	"	"	"	
" "	" "	.. ☉	86. 8.00	51+	"	120	
" 27	Ali Baghan,	.. α Cephei,	85.33.10	48.5+	"	110	
" "	" "	.. β Aquarii,	124.55.20	"	"	68	
" "	" "	.. ε Pegasi,	98.42.50	"	"	78	
" "	" "	.. α Aquarii,	129.32.10	"	"	"	
" "	" "	.. "	109. 3.40	"	"	"	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitudes.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Oct. 23.	Barikab,	☉	84.58.40	30. +	28. 36	105	
" 29	North Chardch,	☉	84.26.30	50. +	28. 63	105	
" "	Bussoollah, ..						
" "	" "	ε Pegasi,	129.46.30	" "	" "	62	
" "	" "	α Aquarii,	109.18.10	" "	" "	"	
" 30	Lalpore,	☉	83.50.30	33. +	28. 75	103	
" "	" "	α Aquarii,	109.21.10	" "	" "	65	
" "	" "	ξ Pegasi,	131.32.30	" "	" "	"	Mean Lat.
" "	" "	Fomalhaut,	50.39.00	" "	" "	"	Lalpore, 34° 13' 25"
" 31	" "	☉	83.10.10	45. +	28. 73	109	
" "	" "	α Aquarii,	109.22.00	" "	" "	65	
" "	" "	ξ Pegasi,	131.32.40	" "	" "	"	
" "	" "	Fomalhaut,	50.39.50	" "	" "	"	
Nov. 1.	Lundye Khanal, ..	☉	82.45.10	42. +	27. 67	93	
" "	" "	ξ Pegasi,	130. 3.10	" "	" "	60	
" "	" "	α Aquarii,	109.35.20	" "	" "	62	
" 2	" "	☉	82. 6.25	40. +	" "	90	
" "	" "	α Aquarii,	109.35.25	" "	" "	62	
" 4	Ali Musjeed,	☉	81. 2.20	" "	27. 70	90	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1839.							
Nov. 5	Mouth of Khyber.	ξ Pegasi,	132. 2.00	40. +	28. 4	64	
" "	" "	Fomalhaut,	51. 9. 5	"	"	"	
" 7	Peshawur,	⊙	79.14.00	"	29. 1	90	
" 8	" "	ξ Pegasi,	131.59.10	35. +	"	60	
" "	" "	Fomalhaut,	51. 6.15	"	"	"	
" "	" "	Sirius,	79. 1.40	"	"	50	Mean Lat.
" "	" "	Procyon,	123.15.30	"	"	"	Peshawur, 34° 00' 5"
" 9	" "	⊙	78. 3.50	"	"	90	
" 11	" "	ξ Pegasi,	76.55.25	43. +	"	59	
" "	" "	⊙	131.59.25	"	"	"	
" "	" "	Fomalhaut,	56. 6.20	"	"	"	
" 12	" "	⊙	76.22.25	50. +	"	90	
" 13	" "	⊙	75.49.25	47. +	"	98	
" 14	" "	⊙	75.17.30	50. +	"	10	
" 15	" "	⊙	74.45.50	"	"	"	
" 16	" "	⊙	74.15.30	48.8+	"	98	
1840.	Bussont,	Rigel,	94.16.30	41.6+	28. 5	33	
Jan. 11	Near Julalabad, .. ε	Orionis,	103.25.50	"	"	"	
" "	" "	Belelgeux,	125.46.50	"	"	"	

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1840.							
Jan'y 12	Shaiwa, ..	..	94. 5.20	41.6+	28. 22	40	
" 13	" ..	..	125.36.00	"	" "	"	
" 17	Pushut, ..	..	67. 6.00	"	" "	73	
" "	Camp, ..	..	93.47.50	"	27. 62	38	
" "	" ..	..	107.57.10	"	" "	"	
" "	" ..	..	125.18.25	"	" "	"	
" 25	Rushut Fort, ..	..	82.38.10	"	" "	37	
" "	" ..	..	93.46.40	"	" "	"	
" "	" ..	..	107.56.10	"	" "	42°	
" "	" ..	..	125.17.10	"	" "	"	
" 29	" ..	..	73.44.40	45. +	" "	75	h. m. s. Long. Assd. 4. 43.20. E.
" 30	" ..	..	93.46.50	"	" "	42	
" "	" ..	..	107.56.15	"	" "	"	
" "	" ..	..	125.17.30	"	" "	"	
" Feb'y. 1.	" ..	..	82.38.00	"	" "	"	
" 2	" ..	..	75.56.40	37. +	" "	71	
" 8	" ..	..	79.31.45	50. +	" "	72	
March 2	Chugar Serai, ..	..	77.17.20	53. +	27. 45	63	On roof of house only
" "	" ..	..	121.31.30	42. +	" "	60	tremulous.
" 4	Otipore, ..	..	107.34.00	"	27. 25	"	Good

Observations for Latitude from Mer. Altitudes of the Sun or Stars,—(continued.)

Date.	Station.	Heavenly body.	Observed Altitude.	Error.	Barometer.	Therm.	REMARKS.
1840. March 4	Olipore,	Beleigeux,	124.54.50	53+	27.25	60	Mean Lat.
"	"	Sirius,	77.11.10	"	"	"	Olipore.
"	"	Procyon,	121.26.10	"	"	"	34° 54' 38."
" 7	"	"	121.26.10	35+	"	50	"
" 9	"	"	77.11.30	"	"	"	Cloudy.
" 14	"	"	100.48.20	"	"	85	Assd. Long. 4h. 43m. E.
"	"	Sirius,	104.44.10	31+	"	100	"
"	"	Procyon,	77.11.40	"	"	58	"
"	"	"	121.26.00	"	"	"	"
"	"	"	94.14.30	"	"	"	"
" 15	"	"	105.31.30	42.5+	"	97	Cloudy.
" 17	Chugar Serai,	Sirius,	77.17.10	"	"	58	Mean Lat.
"	"	Hydræ,	94.20.40	"	"	63	"
"	"	Regulus,	133.44.50	"	"	61	Chugar Serai.
" 22	Pushut Fort,	"	111.25.10	56+	"	98	34° 51' 43" 7.
" 23	"	"	112.13.10	"	27.62	"	"
" 27	"	"	115.21.15	29+	"	90	"
" 28	Koonur,	"	122. 0. 0	"	"	80	"
"	"	Procyon,	94.49.10	"	27.800	55	Mean Lat.
"	"	Hydræ,	136.14.00	"	"	52	Koonur.
" 29	"	Regulus,	117. 6.20	"	"	"	34° 37' 37"
"	"	"	"	"	"	88	"

Observations for Azimuth.

Date.	Station.	Time.	Observed Altitude	Bearing.
1840.				
April 3	Pushut Fort,	10. 1.20 A. M.	50.47.43	⊙ Altitude L. L. Bearing Centre.
" 4	"	10. 6.00 "	51.30.26	
" 4	"	7.17.00 "	20.28.24	
" "	"	7.19.15 "	20.58.54	
" "	"	8.15.00 "	32. 9. 4	
" "	"	8.21.00 "	33.19.15	⊙ Altitude L. L. Bearing Centre.
" "	"	8.26.00 "	34.18.14	
" "	"	8.32.10 "	35.33.28	
" "	"	8.37.10 "	36.30.25	
" "	"	7.45.00 P. M.	29.57.53	
" "	"	7.50.00 "	29.20.15	Sirius setting.
" "	"	7.54.30 "	21.32.35	
" "	"	7.59.30 "	22.33.30	Bootes rising.
" "	"	8. 3.30 "	16.15.11	
" "	"	8. 8.40 "	17. 9. 4	Spica rising.
" "	"	8.13.20 "	16.48.43	
" "	"	8.21.30 "	15.17.12	Rigel setting.
" 5	"	7. 5.10 A. M.	18.38.34	
" "	"	7.10.10 "	19.37.38	⊙ Altitude L. L. Bearing Centre.
" "	"	8. 9.40 "	31.37.34	
" "	"	8.14.40 "	32.28.23	

Date.	Station.	Time.	Observed Altitude.	Bearing.
1840.				
April 14	Olipore,	6.16.40 A. M.	12.42.39	<div> <div>84° 30' 30" 29'</div> <div>85° 35' 5' 4'</div> <div>85° 21' 0' 0'</div> <div>86° 10' 0' 9'</div> <div>87° 24' 5' 3'</div> </div> <div>☉ Altitude L. L. Bearing Centre.</div>
"	"	6.20.00 "	13.25.24	
"	"	6.23.35 "	14. 2. 5	
"	"	6.27. 5 "	14.54.51	
"	"	6.31.00 "	15.14.38	
"	"	9.45.30 P. M.	18.30.27	<div> <div>261° 53' 4' 3'</div> <div>263° 36' 7' 6'</div> <div>265° 49' 9' 50'</div> </div> <div>Procyon setting.</div>
"	"	9.51.45 "	17.18.14	
"	"	9.57.20 "	16.13. 9	
"	"	10. 1.45 "	21.10. 6	<div> <div>58° 43' 2' 3'</div> <div>56° 1' 2' 0'</div> <div>55° 11' 10' 11'</div> </div> <div>Lyra rising.</div>
"	"	10. 6.10 "	21.53.49	
"	"	10.11.00 "	22.51.47	
"	"	10.16.00 "	31.26.21	<div> <div>141° 39' 9' 9'</div> <div>141° 28' 9' 8'</div> </div> <div>Jupiter rising.</div>
"	"	10.20.00 "	31.54.49	
"	"	10.25.20 "	33.20.24	<div> <div>358° 40' 2' 1'</div> <div>357° 12' 10' 11'</div> </div> <div>Polaris.</div>
"	"	10.30.30 "	33.25.20	
"	"	10.46.30 "	19.38.34	<div> <div>242° 20' 0' 1'</div> <div>242° 57' 8' 8'</div> <div>243° 40' 1' 1'</div> </div> <div>^a Hydra setting.</div>
"	"	10.50.30 "	18.53.49	
"	"	10.54.40 "	18. 7. 3	
"	"			

Observations for Azimuth.

Date,	Station.	Time.	Observed Altitude.	Bearing.
1840.				
April 21	Olipore,	6.41.00 P. M.	15.22.20	84° 0' 1' 1'
" "	" "	6.44.00 "		
" "	" "	6.49.00 "	17.17.20	85° 51' 1' 0' } Altitude L. L.
" "	" "	6.54.00 "	18. 5. 1	85° 40' 0' 39' } Bearing Centre.
" "	" "	6.59.00 "	19. 5. 1	86° 20' 0' 19'
" 22	" "	6.28.15 "	12.55.51	79° 49' 9' 50'
" "	" "	6.33.15 "	13.57.54	80° 15' 5' 3' }
" "	" "	6.38.20 "	15.	81° 41' 0' 0' } Altitude L. L.
" "	" "	6.43.15 "	16. 5. 1	82° 23' 2' 2' } Bearing Centre.
" "	" "	6.48.15 "	17. 7. 3	88° 17' 6' 6'

These attempts at Azimuth observations were made with one of the small original Theodolites of Colonel Everest by Robinson, which I procured from Lieutenant Durant.

The Altitude are had 2 verniers, the difference in the reading off generally amounting to 3' 4'.

The Azimuth are had 3 verniers, two of which generally gave the same result, the third differing 1'.

Both verniers read off to single minutes.

In the column of bearings the three minutes readings are not given in full, the first figure of the second and third readings not being given, except when it differs from the first figure of the first reading.

Thus 80° 15' 5' 3' means, 80° 15' 15' 13'.

Thus 85° 40' 0' 39' means, 85° 40' 40' 39'.

The time was taken by a watch of ordinary merit, attempted to be corrected to apparent time by observations

I give the observations in the hopes they may lead to some approximation to the truth; they were the first I ever made, and I was quite alone.

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Observed Altitude.

1840.				A. M.		P. M.			
April	2	Pushut Fort,	..	⊙ L. L. ..	10. 0.15	100° 20' 00"	=	1.46	} Equal Altitudes.
"	3	"	..	..	10. 1.20	100.40.00	=	1.45
"	3	"	..	..	10. 2.20	106.00.00	=	1.44
"	3	"	..	⊙ L. L. ..	9.44.40	96.20	=	1.59.10	} Equal Altitudes.
"	3	"	..	..	9.46.40	97.00	=	1.57
"	14	Olipore,	..	⊙ L. L. ..	9.26.35	99.20	=	1.54.20	} Equal Altitudes.
"	14	Olipore,	..	..	9.27.35	99.40	=	1.54.30
"	20	Olipore,	..	⊙ L. L. ..	9.47.15	96.00	} Error 43" +	} Therm. 109. Bar. 27.25.	} Equal Altitudes.
"	20	Olipore,	..	..	9.48.35	96.30		
"	20	Olipore,	..	..	9.50.00	97.00		
"	20	Olipore,	..	..	9.51.15	97.30		
"	20	Olipore,	..	..	9.52.36	98.00		
"	21	Olipore,	..	⊙ L. L. ..	8.56.40	85.40	=	2.58.25	} Equal Altitudes.
"	21	Olipore,	..	..	8.57.30	86.00	=	2.57.40
"	21	Olipore,	..	..	8.58.20	86.20	=	2.56.45
"	21	Olipore,	..	..	8.59.15	86.40	=	2.55.50
"	21	Olipore,	..	..	9. 0.14	87.00	=	2.55.00

I add these observations for time, which are very indifferent; my watch having no second hand, besides it is difficult, if not impossible, for a single observer to make accurate observations for time. I also subjoin attempts at ascertaining the loss of time.

I also subjoin attempts for a single observer to make accurate observations for time.

Observed Altitude,—(Continued.)

1840.

April	23	Olipore,	7.27.20	A.M.	17° 6' 2'	⋔	Altitude U. L.
"	"	"	7.29.00	"	25° 34' 30'	⊙	Altitude L. L.
"	"	"	7.30.30	"	110° 54' 10'		Lunar distance.
"	"	"	7.32.00	"	26° 8' 4'	⊙	Altitude L. L.
"	"	"	7.33.00	"	16° 26' 22'	⋔	Altitude U. L.
"	"	"	7.34.00	"	110° 52' 40'		Lunar distance.
"	"	"	7.35.00	"	16° 10' 6'	⋔	Altitude U. L.
"	"	"	7.36.30	"	27° 4' 0'	⊙	Altitude L. L.
"	"	"	7.37.20	"	110° 51' 20'		Lunar distance.
"	"	"	7.38.00	"	27° 24' 20'	⊙	Altitude L. L.
"	"	"	7.39.00	"	15° 39' 35'	⋔	Altitude U. L.
"	"	"	7.40.00	"	110° 50' 20'		Lunar distance.
"	"	"	7.40.10	"	15° 25'	⋔	Altitude U. L.
"	"	"	7.41.00	"	28° 13'	⊙	Altitude L. L.
"	"	"	7.42.40	"	110° 49' 40'		Lunar distance.

Observations for Time.

"	"	"	7.51.50	=	60.30.00	} Cloudy all the afternoon. Therm.
"	"	"	7.53. 6	=	61.00.00	
"	"	"	7.54.20	=	61.30.00	
"	"	"	7.55.32	=	62.00.00	
"	"	"	7.57.45	=	62.30.00	

For Longitude.

"	24	"	7. 0.35	=	26° 48' 44'	} ⋔ Altitude Upper Limb.
"	"	"	7. 1.35	=	26° 43' 39'	
"	"	"	7. 2.35	=	26° 28' 33'	
"	"	"	7. 3.35	=	26° 39' 39'	
"	"	"	7. 4.35	=	26° 29' 25'	
"	"	"	7. 6.35	=	20° 57' 52'	} ⊙ Altitude Lower Limb.
"	"	"	7. 7.35	=	21° 9' 4'	
"	"	"	7. 8.35	=	21° 21' 17'	
"	"	"	7. 9.35	=	21° 32' 29'	
"	"	"	7.10.35	=	21° 45' 41'	
"	"	"	7.11.50	=	99° 53' 40'	} Lunar distances, Sextant.
"	"	"	7.12.50	=	99° 53' 30'	
"	"	"	7.14.00	=	99° 53' 15'	
"	"	"	7.15.00	=	99° 53' 5'	
"	"	"	7.15.00	=	99° 52' 40'	
"	"	"	7.17.30	=	20° 29' 25'	} ⋔ Altitude Upper Limb.
"	"	"	7.18.30	=	25° 24' 20'	
"	"	"	7.19.30	=	25° 19' 14'	
"	"	"	7.20.30	=	25° 14' 10'	
"	"	"	7.21.30	=	25° 9' 4'	

For Longitude,—(Continued.)

1840.		h. m. s. A.M.	
April 24	Olipore,	7.23.00	" = 24° 18' 14'
"	"	7.24.00	" = 24° 28' 24'
"	"	7.25.00	" = 24° 40' 36'
"	"	7.26.00	" = 24° 54' 50'
"	"	7.27.00	" = 25° 6' 2'

⊙ Alt. Lower Limb.

Observations for the Time.

"	"	7.29.50	A.M. = 51° 20' 00'	} With Sextant. Therm. 75. Bar. 27.25.
"	"	7.30.35	" = 51° 40' 00'	
"	"	7.31.29	" = 52° 00' 00'	
"	"	7.32.18	" = 52° 20' 00'	
"	"	7.33. 3	" = 52° 40' 00'	Error 43" +.
"	"	4.20.10	P.M. = 58° 00' 00'	} With Sextant. Therm. 80. Bar. 27.25.
"	"	4.12.45	" = 57° 40' 00'	
"	"	4.13.31	" = 57° 20' 00'	
"	"	4.14.25	" = 57° 00' 00'	
"	"	4.15.16	" = 56° 40' 00'	

For Longitude.

		h. m. s. A.M.	
"	25	6.43.20	" = 66° 28' 00'
"	"	6.44.20	" = 66° 27' 00'
"	"	6.45.20	" = 66° 24' 50'
"	"	6.46.20	" = 66° 22' 40'
"	"	6.47.20	" = 66° 21' 00'
"	"	6.49.00	" = 17° 26' 22'
"	"	6.50.00	" = 17° 39' 34'
"	"	6.51.00	" = 17° 50' 46'
"	"	6.52.00	" = 18° 3'
"	"	6.53.00	" = 18° 18' 14'
"	"	6.55.00	" = 88° 36' 50'
"	"	6.56.00	" = 88° 36' 25'
"	"	6.57.00	" = 88° 36' 00'
"	"	6.58.00	" = 88° 35' 40'
"	"	6.59.00	" = 88° 35' 25'
"	"	7. 3.00	" = 65° 31' 00'
"	"	7. 4.00	" = 65° 26' 00'
"	"	7. 5.00	" = 65° 23' 00'
"	"	7. 6.00	" = 65° 19' 00'
"	"	7. 7.00	" = 65° 14' 50'

Altitude.

) Upper Limb Sextant.

⊙ Alt. Lower Limb.
Theodolite.

Lun. distances, Sext.

) Alt. Upper L. Sext.

For Longitude,—(Continued.)

1840.		h. m. s. A.M.		} ⊙ Alt. Lower Limb, Theodolite.
April	25	Olipore,	7. 8.28	
"	"	"	7. 9.30	
"	"	"	7.10.30	
"	"	"	7.11.30	
"	"	"	7.12.30	
			" = 21° 23' 19'	
			" = 21° 36' 32'	
			" = 21° 48' 44'	
			" = 22° 2'	
			" = 22° 15' 11'	

Observations for Longitude entirely with Sextant.

		A. M.		} Alt. Upper Limb.
"	"	"	7.16.00	
"	"	"	7.17.00	
"	"	"	7.18.00	
"	"	"	7.19. 5	
"	"	"	7.20. 0	" = 64° 30' 40'
			" = 64° 25' 25'	
			" = 64° 20' 00'	
			" = 64° 13' 40'	
			" = 64° 8' 10'	
			7.23.20	" = 48° 40' 00'
			7.24.10	" = 49° 00' 00'
			7.25.00	" = 49° 20' 00'
			7.25.47	" = 49° 40' 00'
			7.26.36	" = 50° 00' 00'
			7.28. 5	" = 88.27.00
			7.29.00	" = 88.26.25
			7.30.00	" = 88.25.50
			7.31.00	" = 88.26.50
			7.32.00	" = 88.25.35
			7.33.00	" = 88.25.30
			7.34.00	" = 88.25.10
			7.36.30	" = 62.16.00
			7.37.30	" = 62. 7.00
			7.38.30	" = 61.59.00
			7.39.30	" = 61.51.10
			7.40.30	" = 61.44.00
			7.42.39	" = 56.40.00
			7.43.20	" = 57.00.00
			7.44.12	" = 57.20.00
			7.44.55	" = 57.40.00
			7.45.40	" = 58.00.00
			9.31.54	" = 100.00.00 = 2. 7.34
			9.32.44	" = 100.20.00 = 2.26.40
			9.33.33	" = 100.40.00 = 2.25.45
			9.34.25	" = 101.00.00 = 2.24.55

Equal Alt. for
the time.

Observations for Longitude with Sextant.

1840.		h. m. s. A. M.		
April	26	Olipore,	7.21.00	" = 76° 8' 20'
"	"	"	7.22.00	" = 76° 8' 20'
"	"	"	7.23.00	" = 76° 7' 50'
"	"	"	7.24.00	" = 76° 6' 10'
"	"	"	7.25.00	" = 76° 5' 30'
"	"	"	7.27.50	" = 51° 40' 00'
"	"	"	7.28.38	" = 51° 00' 00'
"	"	"	7.29.22	" = 51° 20' 00'
"	"	"	7.30. 8	" = 51° 40' 00'
"	"	"	7.30.58	" = 52° 00' 00'
"	"	"	7.33.00	" = 76° 43' 20'
"	"	"	7.34.00	" = 76° 42' 40'
"	"	"	7.35.00	" = 76° 42' 50'
"	"	"	7.36.00	" = 76° 42' 20'
"	"	"	7.37.00	" = 76° 42' 20'
"	"	"	7.38.00	" = 76° 41' 20'
"	"	"	7.39.00	" = 76° 41' 25'
"	"	"	7.42.00	" = 75° 27' 40'
"	"	"	7.43.00	" = 75° 24' 25'
"	"	"	7.44.00	" = 75° 20' 45'
"	"	"	7.45.00	" = 75° 16' 30'
"	"	"	7.46.00	" = 75° 12' 20'
"	"	"	7.48.39	" = 59° 20' 00'
"	"	"	7.49.21	" = 59° 40' 00'
"	"	"	7.50. 9	" = 60° 00' 00'
"	"	"	7.51.00	" = 60° 20' 00'
"	"	"	7.51.48	" = 60° 40' 00'

} Alt. Upper Limb.

⊙ Alt. Lower Limb.

} Lunar distances, Upper Limb.

} Alt. Upper Limb.

⊙ Alt. Lower Limb.

Observations for Time, Equal Altitudes.

		h. m. s. A. M.		h. m. s. P. M.	
"	"	"	9. 8.29	" = 91° 20' 00'	= 2.51.20 "
"	"	"	9. 9.25	" = 91° 40' 00'	= 2.50.32 "
"	"	"	9.10.17	" = 92° 00' 00'	= 2.49.44 "
"	"	"	9.11. 9	" = 92° 20' 00'	= 2.48.51 "
"	"	"	9.12. 2	" = 92° 40' 00'	= 2.47.48 "

In submitting these observations, I beg that it may be understood that I do not claim for any, except those for Latitude, even a tolerable amount of correctness. They are only the attempts of a tyro, under considerable disadvantages; and I dare say are rendered worthless by omissions, and even by absurdities. I have no theoretical knowledge of the subject whatever. Symes Nautical Tables have been my guide, and I have endeavoured to follow him, to the best of my ability.

I should not have ventured to submit those for Azimuth, Time or Longitude, did I not believe that no more competent person than myself has been at Olipore.

*Grammar and Vocabulary of the Cashmiri Language. By M. P.
EDGEWORTH, ESQ. Bengal Civil Service.*

When stationed at Lodi-hana in 1839, I was induced to attempt to learn the Cashmiri language, in consequence of the large Cashmiri population at that place, many of whom understand no other language, and the necessity of an interpreter in a Police office, I felt to be exceedingly objectionable. With the assistance of Meer Saifuddin, a respectable Syud of Cashmiri birth, I drew up some rudiments of the Grammar. Although these are necessarily very imperfect, and no doubt require numerous corrections, which I should have been able to give, had I been able to prosecute the study further, yet they will be interesting, as throwing some light on what appears to me a very intricate and peculiar dialect.

Alphabet and Orthography.

The Cashmiri language being a derivation of the great Sanscrit stock it has an alphabet of the Nagari form. This is only understood by the Hindoos. The translation of the New Testament published at Serampoor is in this character, and I was able to ascertain the force of most of the signs used in it; but as they do not complete the Alphabet, and I had no means of ascertaining their correctness from any Hindoo Cashmiri, I refrain from giving it.

The cerebrals, and the aspirates of the Nagari are all used, and an additional letter *z* and its aspirate *ts*, and *ts,h*, exactly the German *z* with or without an aspirate; this is represented in the Persian alphabet by ز — As numerous Arabic and Persian words have been introduced, the whole of that alphabet has been incorporated with that portion, equivalent to the Nagari, as in Hindostani.

The great peculiarity of the language consists in possessing three very short vowels, which my instructor denominated the *ním fathe*, *ním kasra* and *ním zamma*, and possessing respectively the forces of a very short *a*, *i*, *u*. It is impossible to give a description in writing of these very peculiar half-vowels. To represent them, I have used the above vowels with a dot, *á*, *í*, *ú*.

There is likewise a short *o*, "*zamma majhúl*," and its corresponding half-vowel.

General Remarks.

The language resembles Hindostani in the two most troublesome parts of that language, but with increased difficulties. The genitive case agrees with the object possessed in gender, number and case having moreover different forms according as the possessing noun is itself masculine, feminine, or neuter.

In like manner the past tenses of the verb agree with the object, while the agent has a peculiar form, which I have termed the agentive case; but the verb agrees in some measure with the agent, as well as the object; at least assumes a modified form according to the person and number of the agent. The verb is in like manner subject to modifications of its termination, where the enclitic pronominal dative is used.

The verb is generally placed in the middle of the sentence as in English; but the object is indifferently placed before or after it.

In forming feminines, the letter of the masculine is generally changed thus:—

m.

d—g—zorj.

t——ts.

k——ch.

n——nj. (the nasal *na* of the Nagri,) ñ of the Spanish.

l——j.

Nouns.

The genitive is formed by adding as the case may be.

	<i>m. s.</i>	<i>an.</i>	<i>m. p.</i>	<i>f. s.</i>	<i>f. p.</i>		
S. Masculine	Sand	(an)	sandi	san̄z	(ac) sanza	sindes*	In all but proper names.
Feminine, or	hand	(a)	handi	han̄z	(za) hauza		Plural in all genders and
Neuter	uk	(ik)		ich	(icha)		and cases.

The accusative by the addition of *as* or *is* in the singular, and *ay* in the plural, thus:

Singular.

{ Nom.	Māül, a father	Nichu, child
{ Gen.	Mālü, sand, &c.	Nichu, sand
{ Ac.	Mālis	Nichavis
{ Agent.	Māil	Nichavi

In proper names the genitive is formed by simply adding *un*, as

Plural.

{	Nom.	Máíl	Nichavi	Nom.	Nushírwán,
	Gen.	Máilan, hand	Nichavin, hand,	Gen.	Nushirwánun
	Ac.	Máilan	Nichavin		
	Ag.	Mailaw	Nichvau,*		

Singular.

{	Nom.	Gabur, (son)
	Gen.	Gabra sand
	Ac.	Gabras,
	Ag.	Gabran,

Plural.

Nom.	Gabar,
Gen.	Gabran, hand
Ac.	Gabran,
Ag.	Gabrau,

Feminine.

<i>Singular.</i>	{	Nom.	Máj, mother,	tsut, bread
		Gen.	Máji, Majihand,	tswachi,—hand
		Ac.	Máji,	tswachi,
		Ag.		

<i>Plural.</i>	{	Nom.	Máji,	tswachi,	Agentive also with filled—ablative.
		Gen.	Májan, hand,	tswachan, hand	
		Ac.	Májan,	tswachan,	
		Ag.	Májaw,	tswachaw,	
	Ab.				

Neuter.

Nom.	Nág, had, fountain	garu, house
Gen.	Náguk, ich, ik, icha,	garuk, ich, iki icha.
Ac.	Nágas	garas
1st Abl.	Nága, nishi, &c.	
2d Ab.	Nági, khota, &c.	
Nom.	Nag,	gar
Gen.	Nágan hand, &c.	garan hand, &c.
Ac.	Nágan,	garan

* This word in the Serampur Testament is spelt nits,hu.

Personal Pronouns.

	1.	2.	3.	
Nom.	I, Bo	You, Tûi	They, Tim	
Gen.	of me, Mi* us	Chá* Tuh**	Tih***	* Genitive terminations. m. <i>f.s. f.p.</i> anyu, ariy, ainyi, anyèy, anis.
Acc.	to me, Mih us	Tsih	timan timar	** hand, hanz, handi, hanza handas.
Inflected.	me, Mi us asi	tsi Tohi	timis timay	*** Also ta and tine with <i>sánd</i> , &c. sanz, sandi, sanza.

Demonstrative and Relative Pronouns.

	Ih			
Nom.	ya or yim, or am or a.—sand &c.**	yamikü.* or ami.**	yim or yima.	* The genitive terminations of the neuter are iku, íchs, íkí, íchi.
Gen.	Yamis or amis**	yat or at**	yiman haud &c.	
Acc.	Yaimis.	yata or ami**	yiman	** This form is used in a particular or proximative sense.
Inflected.	m. Yim f. Yami		yiman yimon	

Nom.	Hú	hum, hume	See as above, without distinction of gender.
Gen.	Humi s & c.	human haud.	
Acc.	Humis	human.	
Abl.	ditto	humon.	
	Hwim		

That distant.

Nom.	Who relate.	m. yus e. f. yasa.	Who : <i>Plural</i> .	yim or yima.	Who? <i>inter</i> .	m. kus. f. kasa. ka or kami-s &c. ka hand, &c. kas or kamas. kim.	Who? <i>inter</i> .	Neuter.	kam. ka- nie. kaman.
Gen.	What.	yanieta.* yat. yama.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.
Acc.	What.	yanieta.* yat. yama.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.
Abl.	What.	yanieta.* yat. yama.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.	yim or yima.

Adverbs of time and place derived from the above.

Of Place.			Of Time.			Of Manner.		
at.	Here	at.	to.	here	to.	by.	hither	way.
yati.	hati.	tati.	yati.	hati.	tati.	yor.	or.	tor.
kati.	yati.		kati.	yati.		kor.	yor.	
is	ih.	hu.	wiryakan.	(then) tilli.	(when) kella,	is	hā pat or kau.	huta pat or kau.
what?	sú.	kus.	(so)	or kar.	yella.	tata pat kau.	kyut, khya, khyetapati, kau.	yut, itu, itapati, kau.
Relation. what—		yus.						

Why ? kyázi.
How many ? kyt, kytu, kyti, kyts, kytsa.
Yet, winya.
Ever, mullye, aslá.
Till, yut táu.
Always, hamesha, dad.

Adverbs.

much, seta yits, tsor, tseri, tsar
 little, maine—kam
 without, nibar
 within, andar
 above, hyùr
 from above } heri pita
 upwards, }
 downwards } bon
 below, tal
 before, boút
 after, pat, patí
 directly, tikan, wil
 yesterday, yow
 day before } átra
 yesterday, }
 to-day, az
 to-morrow, pagah or rúts
 day after } kálkyat
 to-morrow, }
 together, sait

Conjunctions.

p. h.

Even ہے i
 and, ta, or be
 or ya, kina ?
 though,
 although, yudunte, agarche
 since, yelli
 because, yowkani
 if, yudwai, hargahai, hargah, or ai
 added to the nominative
 but, lekin, ama
 unless, nai

m. f. m. p. f. p.

except, magari, yátii, yáts, yáti, yatsa
 then پس adi
 therefore, awai or awai khatir
 else, nata
 either,

Prepositions.

from, nishi-pita ; a after a poss.
 by, nishi
 to, not
 upon, pèt
 after, pat
 before, borit borita
 with, seit, swán
 without, ru'st
 near, nish
 in, andar
 m. s. f. s. m. p. f. p.
 for, kyut, kylits, kyit, kyits
 on account of, khatir, after genitive
 between, manz, manzbag
 towards, kun
 than, (com- } khota
 parison) }
 except, (but) yatu, siwa, warai, rust
 m. f.

equal to, yatu, or sambù, sambì asamb
 just now, àdi
 also, ti
 like, }
 although ! } zan

sait, meaning *with* governs the accusative

sait, meaning *by means of*, governs the genitive or the case in *au* in plural.

andra, between, governs "i" in singular, "au" in plural.

khota, without, governs genitive, or accusative in plural, and in the neuter, the ablative in "i."

Pronouns and Pronominal Adjectives.

Some. m. kats kaiti kaityah katsan
 (several) f. katsa katsa kaitsah kaithyan

Any.	<i>m.</i> <i>f.</i>	kunh	kaúh kaúh	koutshah kautshah	kainsi		
Some. (few)	<i>nom.</i> <i>obj.</i>	kiuh,	keutshah, keutsau.	k			
Such. (taisa)	<i>m.</i> <i>f.</i>	titú, titsa	<i>accus.</i>	tithis titsi	<i>pl.</i>	titi titsaha	tithan titsan
Kaisa.	kitü or kihü kitsa or kish	kithis, kihis kitsi, kishi		kiti, kihi kitsaha kishi		kithan, kihan kitsan, kishan	
Jaisa.	yutü yitsa	yithis yitsi		yiti yitsahä		yithan yitsahan	
Aisa.	hutü hutsa	huthis hutsi		huti hutsaha		huthan hutsahan	

The termination *m.* hut, hatî, *f.* hats, hatsa, is equivalent to the Persian *nâk*, or English "full."

Verbs.

The substantive and auxiliary verb "to be," "to be to," *i. e.* to (have, with dative and indicative.)

1. Present Indefinite.

1	{	♂	chhus, <i>am</i>	chhi	chhum	chhu
		♀	chhes	chhe	chhem	chhe
2	{	♂	chhukh	chhiwa	chhwi	chhowa
		♀	chhekh	chhewa	chhi	chhewa
3	{	♂	chhú	chhi	chhus	chhukh
		♀	chhé	chhi	chhis	chhekh

2. Past Indefinite.

1	{	♂	ásus, <i>was</i>	áis	ásum	ásü
		♀	Ases	áäsä	ásem	ási
2	{	♂	asukh	áséwa	áswi	ásuwa
		♀	ásekh	ásewa	ási	ásewa
3	{	♂	áüs	áis	ásus	ásukh
		♀	áäs	áäsan	áses	ásekh

3. Aorist, or Future, May or will be.

1	áäsa	áäsaw
2	áüsakh	áäsyü
3	áäsi	áäsan

4. Present Definite, am

ásán chhus, &c. ásanchhum, &c.

5. Perfect, have been

ásán ásus, &c. ásán ásum, &c.

6. Imperfect, was being

a'smut chhus, &c. a'smut chhum

7. *Pluperfect*, had been.

a'smut a'sus a'smut a'sum

8. *Conditional Past*, might have been.

ásmut ása, &c.

V. A. *Intransitive*, bihun, to sit; wathun, to stand up; pyun, to fall.*Imperative.*

s.	{ 2. bih, sit	wath	pi
	{ 3. bihin, let him sit	wathin	piyin
pl.	{ 2. bihyü	wathyü	piyü
	{ 3. bihin	wathin'	piyin

Aorist, or Future.

s.	{ 1. biha	watha	pima
	{ 2. bihakh	wathakh	pikh
	{ 3. bihi	wathi	piya
pl.	{ 1. bihow	wathow	pimow
	{ 2. bihyü	wathyu'	piyu
	{ 3. bihan	wathau	piyan'

Present.

withan, chus	piyan' chhus
—— chhukh	
—— chhu, &c. &c.	

Imperfect.

Bihan ásus
 —— ásuKh
 —— áus, &c.
 —— asa
 —— asakh
 —— asi, &c.

Feminine.	Masculine.	Byuthus	wuthus	pyos
		byuthukh	wuthukh	pyokh
		bihuth byúth	woth	pyou
		bethi	wuthi	
		bethwa	wuthiwa	
		bethi	wuthi	
		bethis	wutsus	
		bethikh	wutsekh	
		beth	wuts	
		becha	wutsa	
		bechawa	wutsewa	
		becha	wutsa	

Perfect.

m. s. 1.	byuthmat chhus
f. s. 1.	bethmits chhes
m. p. 1.	bethmit chhi
f. p. 1.	bechamatsa chhe
	behawun

Pluperfect.

asus	wuthmit
	watsmuts
	withimit
	watsimatsa
	bihunwal

*1 Mood.—Tenses, with
Objective Inflections like
the Future.*

<i>Feminine.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>	
1	kar,	1	karan	2	kar	3	karakh	4	karakh
2	—	2	karinas	3	—	3	—	5	—
3	—	3	kar yun	4	—	4	—	6	—
4	—	4	— in	5	—	5	—	7	—

<i>Feminine.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>	
1	kar-a	1	kar-au	2	kar-at	3	kar-awa	4	kar-awa
2	— akh	2	— ah-au	5	—	6	—	7	—
3	— i	3	— is	8	—	9	—	10	—
4	— ow	4	— owu	11	—	12	—	13	—
5	— yu	5	— yun	14	—	15	—	16	—
6	— au	6	— auas	17	—	18	—	19	—

<i>Feminine.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>		<i>Plur. sing.</i>	
1	karán	1	chhus	2	chhus-an	3	chhus-aw	4	chhus-aw
2	— chhukh	2	— chhukh	5	—	6	—	7	—
3	— chhu	3	— chhu	8	—	9	—	10	—
4	— chhi	4	— chhin	11	—	12	—	13	—
5	— chhawa	5	— chhawan	14	—	15	—	16	—
6	— chhi	6	— chhis	17	—	18	—	19	—
7	— chhes	7	— chhesan	20	—	21	—	22	—
8	— chhekh	8	— chhehan	23	—	24	—	25	—
9	— chhe	9	— chhes	26	—	27	—	28	—
10	— chhe	10	— chhen	29	—	30	—	31	—
11	— chhewa	11	— chhewan	32	—	33	—	34	—
12	— chhe	12	— chhes	35	—	36	—	37	—

Active Transitive Verb—karun, To do.

<i>I.—Imperative—do.</i>		<i>II.—Aorist or Future. Will or may do.</i>	
1	—	1	—
2	—	2	—
3	—	3	—
4	—	4	—
5	—	5	—
6	—	6	—
7	—	7	—

The same as I. with *asi* added

chu-asi.

chhum

IV.—*Imperfect*. Was doing.

karan' ásus	ásus-au	ásus-akh	ásus-at	ásus-awa	&c.
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V.—*Imperfect*. Might be doing.

karan' asa	kuan'-asau	&c. &c.
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VI.—*Respectful Imperative*. Please to do.

2 karta	kartan
3 karitan	karitanas

2 kartyú	kartyun
3 karitan	karitanas

Infinitive.

m. s. karun	m. p. karani	f. s. karany	f. p. karaniya
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Present Participle.

m. s. koronwául, declined like maul

or korowunul

f. korowaj

korowajayñ

pl. kor-onwajiniye

— iwianiya

Perfect Participle.

korit, indeclinable.

II.—Tenses with Objective Inflections, like the Past Indefinite.

Objective.

		3d Person.		2d Person.		1st Person.		Dative.	
		singular.	plural.	singular.	plural.	singular.	plural.	2d Person.	singular.
Object. Mas.	Agent.	um	im-tim	umakh	imúa	—	—	—	—
		uthan	it	—	—	uthas	it-asi	—	umai
		un	in	unakh	inawa	unas	un-asi	unai	—
		ú	ü	ukh	inawa	—	—	unai	—
		uwan	üwa	—	—	uwas	iwa-asi	—	—
		ukh	ikh	uhakh	ihawa	uhas	èkh-asi	uhai	—

Object. Fem.

em	em
ethan	etham
in	in
ai	ai
iwan	iwan
ikh	ikh

emakh	imua
inakh	inawa
ikh	inawa
ihakh	ihawa

ethas	et-asi
inas	in-asi
iwan	ewa-asi
ihas	ikh-asi

Pluperfect 1st form.

Obj. Masculine.	Agt. pl. Agt. s.	1 komy am
		2 yát
		3 yán or yún
		1 yáu
		2 yúwa
		3 yákh or yúkh

Perfect

karmut	chhum
—	chhwi
—	chhus
karimifí	chhu
—	chhowa
—	chhukh

Pluperfect 2d form

karmut	ásum
—	áswi
—	ásus
karimifí	áús
—	ásowa
—	ásukh

<i>Pluperfect 1st form.</i>		<i>Perfect.</i>		<i>Pluperfect 2d form.</i>	
Obje. Feminine.	1	kom	yaiyam	karimits	ásem
	2	—	yaitha	—	ási,
	3	—	yaiyan	—	áses
	1	—	yaiya	karimitsi	ásu
	2	—	yaiyewa	—	ásewa
	3	—	yaiyekh	—	ásekh
Agt. Pl. Agt. S.					

Past Conditional.
Karmut asi, &c. &c.

The changes in termination for the enclitic object follow this rule—s. of 3d person before akh, as, asi, becomes *n* kh

In the 2d singular *th* is inserted after the open vowel.
The *i* of masculine becomes *e* in feminine.
a or u of singular becomes *i* in plural.

The enclitic pronouns used with verbs are :		<i>Accusative.</i>		<i>Dative.</i>	
	(him)	su	(them)	tim	s.
	th	tsi	ye	tuilh	p.
	me	*bu	us	aitzi	tuilh
	(*often omitted.)			mih	asi.

General Observations on the Verbs.

The negative is formed by adding *na* in all tenses except the *common* imperative; and in compound tenses it is added to the auxiliary, not the participle, for the auxiliary and participle may be separated and dislocated at pleasure, *chhus na korán* or *korán chhus na*. The interrogative is formed by adding a *fatha* to a silent consonant or a dissimilar vowel. If the vowel be *fatha* it is lengthened into *ā*, the expletive *ma* is sometimes used, if negative interrogative *ná* is used instead of *na*.

In the imperative *m* or *ma* is prefixed instead of *n* affixed, except in the imperative in *zí*, when *na* is used as usual.

Intransitive verbs agree with their nominative in number, person, and gender.

Transitive verbs agree with their object and nominative in gender, number and person, with their agent in number and person, but not in gender in the past tenses, *i. e.* of the second mode as,

A man called a woman
Mahnivi manjin zanána

A man called a man
Mahnavi mangan mahnyu

A woman called a woman
Zanáni manjin zanána

A woman called a man
Zanáni mangan mahnyu

The passive is formed by declining *Yun*, to come, with the passive participle in "*mut*."

The causal verb is formed by adding "*náwun*" to the root, as *sheron*, to adorn; *shernáwun*, "cause to adorn."

Form of Verbs of Quality. As Pranun, to be white.

	<i>Imperfect.</i>	<i>Aorist.</i>	<i>Past. Masculine.</i>	<i>Feminine.</i>	<i>Participle, (sifat.)</i>
1. Pran	prana	pran	yūs	yiya	m. s. pranyo' mutū, pl. mīti
2. Pranin	akh	—	yukh	yiyaakh	f. s. — mītsi, pl. matsa
3. Pranin	i	—	yó	yiya	or pranyimītsi
1. Pranyu	—	au	yai	yiya	<i>Second Participle or Adjective.</i>
2. Pranin	—	yu	yawa	yiya	m. s. pranu prani
3. Pranin	—	an	yai	yiya	f. s. prany pranya

Substantive derived thence, pranyer whiteness.
Transitive Verb ditto, panyaráwan to whiten.

Similar to this are the following:—

<i>Infinitive.</i>	<i>Participle.</i>	<div> <div>Mas.</div> <div>Fem.</div> </div>	<i>Substantive.</i>	<i>Transitive Verb.</i>	<i>English.</i>
anun	anyomut	s. —	anyar	anyarawun	be blind
ats, hun	ats, byomut	p. — i	ats, har	ats, harawun	be lazy, sust
badun	badyomut	s. — i	bajar	badráwun	be large
budun	budyomut	p. — i	bujar	budráwun	be old
chhunun	chhunyomut	s. — i	chhunar	chhunyárun	be less
chhetun	chhetyomut	p. — i	chhetsir	chhetsarawun	be white
darun	daryomut	s. — i	darir	dararáwun	stammer
dūrun	dūryomut	p. — i	dúrir	dararáwun	be far

<i>Infinitive.</i>	<i>Participle.</i>	<i>Mas.</i>		<i>Fem.</i>		<i>Substantive.</i>	<i>Transitive verb.</i>	<i>English.</i>
		<i>s.</i>	<i>p.</i>	<i>s.</i>	<i>p.</i>			
halun	halyomut	gatu	- i	gat gacha	- i	gachar	gachrawun	straight
kānun	kalyomut	halu	- i	haj-haja	- i	hajar	halrawun	crooked
kochnun	kānyomut	hibu or hyd	- i	hish-i	- i	hishar		like
lidrun	krehnyomut	kala	- i	kaj-a	- i	kajar	kajrawun	dumb
lōkun	lidryomut	kānu	- i	kāny-ya	- i	kanyar	kanyarawun	one-eyed
matun	lōkyomut	krehnu	- i	ny - ya	- i	khnyar	krehnyarawun	black
mithun	matyomut	lidru	- i	- - - rih	- i	lidrir	lidrawun	yellow
nanun	mithyomut	luku	- i	luh - i	- i	lochar	lukrawun	small
nīlun	nanyomut	matu	- i	mats - a	- i	matsar	matsarawun	mad
nunun	nilyomut	myuth, metts	- i	mitts, michhi	- i	michhar	mithrawun	sweet
sanun	nunyomut	nanu	- i	ny, nyige	- i	nanyar	nanyarawun	evident
sidun	sanyomut	nyul, neli	- i	nej, neja	- i	nejar	nijrawun	blue
tithun	sidyomut	munu	- i	ry ryia	- i	nunyar	nunyarawun	salt
thiun	tithyomut	sanu	- i	ry ryiya	- i	sanyar	sanyarawun	attentive
tsukun	tsukyomut	sidu	- i	siz - a	- i	sizar	sizrawun	straight
ts, bethun	tshetyomut	thadu	- i	theg - a	- i	thazar	thazrawun	tall
wozlun	wozalyomut	tithu	- i	titts, ticka	- i	tichar	tithrawun	bitter
zethun	zethyomut	tsuku	- i	tsuk - a	- i	tsukar		acid
		tsotu	- i	tshot, tshochi	- i	tshochar	tshotrawun	short
		wozalu	- i	wozaj, wuzaj-a	- i	wozjar	wozlawun	red
		zyutts, zeth	- i	zeth, zechhi	- i	zechhar	zithrawun	long
nyakan	nykyomat	niki	nichh	nichha	nichhar	nichhar	nikrawan	be little or thin
vyethun	vyethyomut	vyethi	vyith	vyichhi	vyechhar	vyechhar	vyethrawan	

Irregular Intransitive Verbs.

Defective Verbs.

Remain.

Be sick.

Go out.

Die.

Come.

Go.

Imperative.

s.

p.

gats.h
gats.hyuih
iyumar
maryunér
néryu

los

roz

Aorist.

gatsha
— akh
— iyirma
yikh
yiyamarà
— akh
— i

néra

losa, &c.

roza, &c.

tagyas
tagyi
tagyan
tagyakh
tagyiwa
tagipazyas.
pazyi.
pazyem.
pazyakh.
pazûsa.
pazi.

Present, &c.

maran

yiwan

gatshan

Past Indefinite.

1

gós

gokh

gau

gai

gawa

gai

mudus
mudukh
muddraiis
draikh
draslustus
lustukh
lustrudus
rudukh
rudtagus or tog
togwi
togumtogukh
togiwa
togwedrai
drawa
drailusi
lusiwa
lusirudi
rudiwa
rudi

Past Indefinite.

1	gayes	áyes	moyem	lutsheh	ruzus	tajis
2	gayekh	áyekh	moyekh	lutshekh	ruzekh	&c.
3	gaye	áye	moye	lutsh	ruz	
1	gaye	áye	moye	lotsha	ruza	
2	gayewa	áyewa	moyewa	lotshawa	ruzawa	
3	gaye	áye	moye	lotsha	ruza	

*Feminine.**Pluperfect.*

m.	1	grayáu	ayati	lotshau		
f.	1	grayái	ayayi	lotshaye		

Participle-perfect, Pluperfect, &c.

m.	s.	gomut	mudmut	lotsmut	rudmut	togmut
m.	p.	gomiti	mudmiti	or lotstnut	ruzmut	togmiti
f.	s.	gomuts	mumits	lotshmuts		tijmits
f.	p.	gomutsa	mumitsa	lotshamutra		tijmitsa

Infinitive.

	gats	yun	marun	losun	rozun	tagun
	han					

Infinitive.

Déhsan, To see.

Imperfect.

Caut,

Aorist.

Desha.

Participle.

Deshan.

*Past.**Masculine.*

Dyútham.

—— ut.

Dyúth.

Feminine.

Déthim.

Déthit.

Déttis.

Participle.

Dyúthmut.

Dyúthmiti.

Déthmits.

Déthmitsi.

A.

Anun, *v. a.* to bring.Anun, *v. n.* be blind.Atsun, *v. int.* go in.

tsáu

tsái

Alun, *v. n.* to nod head.Alráwan, *v. a.* to make nod.Asun, *v. n.* to laugh.Apuz, *s. m.* a lie.Apuzyar, *adj.* false.Ashü, *s. m.* tear.Achhü, *s. f.* eyeAchur, *f. m.* word.

Agur, uncut (wood.)

Anü (*pronounced ün*) blind.Ainy, *fem.*Anachiwa, }
gagür, } musk rat.Agun, *s. f.* fire, (especially for
cooking, while Nár is any fire.)

Athá, loose, also hands.

Ant, }
Anchi, *pl.* } stone (of fruit.)Adij, }
Adja, } *s. f.* bone.

Adyul, large bone.

Alü, plough.

AI.

Ail, *s. f.* cardamum.Athij, *s. f.* paste.

Air, hunting.

B.

Behun, <i>ہپورڊن</i> to sit,	Batu, cooked rice.
Bazun, to hear or understand.	Baya, female.
Bázu, regular.	Buth, <i>s. m.</i> face.
Bagrun, <i>v. a.</i> to share.	Báts, <i>s. m. p.</i> people.
áwan, <i>v. a.</i> to divide.	Bachhera, fool.
Bawun, <i>v. a.</i> to explain.	Bungir, <i>s. f.</i> "churi," bracelet.
Buzun, to fry.	Bunj, <i>s. f.</i> plane tree.
	Bai, brother.
	ikakin, brother's wife.
	putr, brother's son.
	waza, brother's daughter.
	Bagü, <i>s. m.</i> share.
	Benji, <i>s. f.</i> sister.
	Bräür or byaur, } cat.
	Bráir, }

CH.

Chyun, to drink.	Chapat, <i>pl. ts. s. f.</i> slap.
Chapan, to hide (in a place,) or tsipun (from a person.)	

CHH.

Chhewun, be drunk.
Chhevyar, (as pranun.)
Chhahun, <i>v. a.</i> to tease.

D.

Dawun, } to run.	Dädu, <i>s. m.</i> pain.
Dorun, }	Dányu, rice, growing.
Deshun, to see.	Duni, whip.
Dyutar, <i>p.</i>	Diuth, } sight.
Detin, <i>i</i> imperative caret.	Dreuth, }
Dyutmut.	Dolá, oblique.
Detmits.	Dwod, <i>s. m.</i> milk.
Dawun, <i>v. a.</i> to cause, to give.	Dand, <i>s. m.</i> bull.
Dazan, <i>v. n.</i> to burn, or be burnt.	Dallun, <i>v. n.</i> pass, to pass by, to pass from.
Dyun, to give, shut, tie.	Dollmut, to blow.
	Dalán, <i>v. a.</i> transitive of the above.
	Dálmüt.
	Dajmits.

G.

- Gonzurun, *v. r.* to think, count. Gotsur, *s. f.* small purse.
 Grezun, to roar, (tiger, river.) Garu *s. m.* house.
 Garun, to cut, (as a carpenter,) Gurti, *s. m.* horse.
 make (as an ironsmith.) Gad, *s. f.* fish.
 Gewun, *v. n.* to sing. Gádáháuz, fisherman.
 Gyo, *m. and f.* the same. Gub, *s. f.* sheep.
 adj. also pregnant.
 Gagür, *s. m.* }
 ir, *s. f.* } rat.
 Gwadü, *s. m.* by, below the knee,
 stem of a tree.
 Gáthu, wisdom.
 ul, *m.* }
 ij, *f.* } *adj.* wise.

H.

- Harahar, dispute.
 Hít, pretence.
 Háts, *s. f.* false accusation.
 Hún, *s. m.* }
 Húiry, *s. f.* } dog.
 infl. Háin.
 Hórun, *v. a.* to repay.
 Halun, (in sco)
 Halyómut.
 Hárún, to lose in play.
 Hyun, to take.
 Hyikun, to be able.
 Háwun, *v. a.* to show.
 Hana, *v. f.* a little not used with
 grains or as a diminutive Gor
 hana, a small horse.
 Hí, jasmine.
 Hí-asmán, lilac.
 Harana, antelope
 Hángaul, deer.
 Háuz, boatman ; not inflected, in
 the agentive case.
 Hichhun, *v. a.* learn.
 Hichhnáwun, *v. a.* teach.
 Haud, *s. m.* ram.
 Hash, *s. f.* mother-in-law.
 Hár, *s. f.* cowrie.
 — *s, m.* necklace.
 Höl, hil, *m.* }
 Haj, haji, *f.* } crooked.

L.

Layun, layu, to beat, (<i>lay on</i>).	M Lat. <i>f. a.</i> a time, pl. <i>lata</i> .
<i>laya, regular.</i>	Lór <i>s. f.</i> stick.
Lagun, <i>f. p.</i> lajis, <i>imp.</i> lag, } <i>attach</i>	Led, <i>adj.</i> cowardly, indeclinable.
<i>gyin, lagmut, lajmitz.</i> } <i>lagna.</i>	Lär <i>s. f.</i> house.
Larun, laryau, yaye, run after.	Lar, <i>s. f.</i> fighting, <i>thread</i> .
Lábun, to find.	Loh, <i>s. f.</i> caracal.
Ladun, to send (a thing.)	Liul, <i>s. m.</i> large earthen pot.
Ladmut, to put (a thing), into	Leji, <i>s. f.</i> small ditto.
(Lazmits, to hang), up or put a	Lang, <i>s. m.</i> thigh, large brand.
thing up or build, &c.	
Likhun,	} to write.
or Lékhun, Likhmut,	
hichh'mits,	
Ledun', <i>v.</i> (in sco,) be cowardly.	
Lasun, <i>v. a.</i> to live.	

M.

Mangun, to demand, in <i>f. g.</i>	Máránwatul, sweeper.
changed to j., maugmut,	Maúl, father.
maujmits.	Maij, mother.
Mathun, to rub, <i>f.</i> mots.	Múth, mut, forgetful.
Mashun, to forget.	Mandáct, modesty.
Muthmút.	Mal, <i>s. m.</i> (Arabic), property.
Mathmits.	<i>s. f.</i> necklace.
Mashráwan, to forget.	Mok,hta, <i>s. m.</i> pearl.
	Mauchh, <i>s. m.</i> honey.
	—— tilo, <i>s. f.</i> honey bee.
	Minyamar <i>s. f.</i> hind, (form of
	Hangal.)
	Musht, <i>s. f.</i> blow.
	Moth, <i>s. f.</i> handful.
	aply apl., chi, handle.
	Mudr, sweet.
	Mur, <i>s. f.</i> fowl-house.
	Mar, serai.
	Mast, <i>s. m.</i> hair of the head.
	Mäts, arm.

N.

	Nag, <i>f.</i> eye.
	Nag, <i>n.</i> lead.
Nerun, <i>v. int.</i> to go out, irregular,	Nichu, child.
<i>past</i> , drao and <i>imp.</i> ner, niri	Nauga. } naked.
put pethydráumut nemwun.	Nithnan. }
<i>past participle</i> , nirit.	Nath-nati, <i>s. f.</i> trembling.
Nyún, to bring, as yun, nyu, nuj.	Naw, nivi, new.
<i>f. p.</i> nyumut.	Navyar, newness.
Nawun, be born, be near,	Nakh, <i>s. m.</i> shoulder,
<i>v. (in esco.)</i> Ho.	Nakha. } near.
Nawráwan, to make new.	_____ tal. }
<i>v. a.</i> invent (a story.)	Nai, <i>conj.</i> if not.
Nahun, <i>v. a.</i> } to obliterate.	Nyatr, marriage.
Nashun, } (obsolete.)	Nyúk.
Nyikun, to become thin (in sco.)	Niki. } thin.
Níkráwan.	Nich. }
Nal tsunun, to wear.	Nichha. }
	Nichhar, thinness.

O.

Onguj, *s. f.* finger.
 Ongul, *s. m.* finger's breadth.

P.

Pushurun, <i>v. r.</i> to make over.	Paz, <i>s. m.</i> truth, pazi, <i>f.</i>
Parun, <i>v. a.</i> to read,	Puzyár-ing, true.
Pyun, to fall.	Pish, flea.
Pyau, } pyai.	Periga, <i>s. f.</i> arzun, chhini, millet.
Peyi, } peyi, (as gatsun.)	Poribar, <i>s. f.</i> shawl.
Páwan, to throw, (find sometimes.)	Put, <i>s. m.</i> } plank,
Parzanun, } recognise.	Pett, pachhi, <i>s. f.</i> } <i>f.</i> small.
or	
Parzanáwun, }	an, <i>m.</i> leaf, thread.
Pránun, <i>v. n.</i> (in esco) be old.	Pán, self.
Pazi, a defective verb, signifying or	Patsh, trust, belief.
to be made, be sure, or	Parzán, acquaintance.
proper,	Posh, flower.

P.

Prarun, <i>v.</i> (in sco.) to wait, for.	Prājī, <i>s. f.</i> straw.
Presun, <i>v.</i> to bring forth, object.	Pránun, old.
Pyayi.	Páth durib, manner.
	Pütsalau, fox.
	Prat, every, (as every day, prat dolu.)
	Parbat, <i>s. m.</i> hill.
	Padü, <i>s. m.</i> sole or print of foot.
	Pâz, hawk in <i>agentive case</i> , paz <i>not</i> pazan.

PH.

Phérun, <i>v. n.</i> return.	Phamb, <i>s. m.</i> cotton or shawl wool.
phyor.	Phras, <i>s. m.</i> poplar.
phyír.	Phyur, <i>s. m. pl.</i> phíri, dress branch of flowers.
Phirun, <i>v. a.</i> turn.	Phyük, <i>s. m.</i> shoulder.
Phalun, to grow old, <i>f.</i> phaji, also to assess; phylana, clothes.	
Phalwun, <i>h</i> in <i>fem.</i> transition of the above.	
Phulun, to flower.	
Phulanawan, transitive.	

R,

Ráwun, <i>v. n.</i> to lose, lost to.	Rats, <i>s. f.</i> night.
Rawrawun, <i>v. a.</i> to lose.	Rus, <i>s. m.</i>
Riwun, <i>v. n.</i> to success, especially in kishtawár ryü.	— kat, infl. ch. <i>f.</i> } deer.
Ruchhun, to keep.	Rátnahún, wolf.
Rachhit thawán, to take care of.	Rúd, <i>s. m.</i> rain.
Ranun, to cook.	Rwáh, <i>s. m.</i> fault.
	Rët, <i>s. m.</i> month.

S.

Sozan, to send a man.	Swan, <i>s. m.</i> gold, a second. <i>s. f.</i> the relationship of one wife to another, amabák.
Saman, samyou, to assemble. to samyáiyü, to unite, resemble.	

S

- Shubun, to be fit, proper or rather, or becoming. Samatsár, participal acting, from Saman, meaning *united*.
 Sítwun, *v. a.* to sew. Suit, *s. m.* wax (more generally used.)
 Säh, lion.
 Siming, lioness.
 Swar, *v. a.* slow music.
 Sangur, *s. m.* mountain.

SH.

- Shungun, Shong, Shurúg, Shwinj, Shála, *s. m.* Pan. italicum, millet.
 Shwinja, to sleep. Shur, *s. m.* a child of either sex.
 Shichh, information.
 Shál, jackall.

T.

- Tráun, *v. a.* to leave off. Tamul, *s. m.* rice uncooked or tuna, when used with phalle.
 Tráwanáwan, to make, to leave off. Tarukh, *s. m.* star.
 Trawit tsunun, to throw away. Tilr, *s. f.* bee, wasp.
 Táúth, *adj.* Taithi, *m.* love, friendship.
 Taith, Tachha, *f.*
 Tyuth, tuh; bitter.
 Tinj, *s. f.* string, (to tie, dyún,) to give.
 Tál, *s. f.* talyun, *s. m.* top of head, *s. m.* gum of mouth.

TH.

- Thawun, to place. Thári, *s. f.* bush, bushy plant.
 Thurun, to make, *form*. Thar, *s. f.* back.
 Thíya, in presence of, evidently.

T.

- Tikun, to run, *n.* haste.
 Tikyou, tikyye, *v.*

TH.

Thahrun, *v. n.*
 Thahrawan, *v. a.* } to stop.

TS.

Tsadun, to call, regular.
 Tsanun, to cast, regular, strike, like
 anun.
 Tsalun, }
 tsalmut, } runaway, go away.
 tsajmits. }
 Tsanun, *v. a.* bring in.
 Tsetun, *v. a.* to tear, interrupt, to
 borrow, settle, &c. &c. قطع
 Ts, henun, *v. i.* to be torn.
 Tsissun, to hide, اړاطع
 Tsokun, *v. (sco.)* be acid.
 Tsapa, silence.
 Tsandar, *s. m.* new moon.
 Tsetas, remembrance, used with
 yun and pyun, to recollect;
 tháwan, to remember.
 Tsor, mtser, *m. f.* more, tsetun, *f.*
 hen sparrow.
 Tsak, *s. f.* anger, used with k, hasun
 and yun.
 Tsep, *verb neu.* hiding from a person.
 Tsai, properly, shade.
 Tsäud, blow.
 T,shawul, } *s. m.* {
 ————uj, } *s. f.* { goat.
 Tsér *s. m.* lateness, or *s. f.* apricot.
 Tsór, four.
 Tsuk, acid.
 Tswakyar, acidity.

U.

Uphun, to fly.

V.

Viyinj, *s. f.* fairy.

W.

Wathun,
 ——— wuthmut, }
 ——— witsmits, } to stand up.
 Wasan,
 ——— wathmut, }
 ——— wathmats, } to come
 down.
 Wothirun, to clean.
 Watharun, to spread.
 Wuzmal, *s. f.* lightning.
 Wushka, *s. f.* barley.
 Wodinya, }
 or } indeclinable, stand-
 Wotadinya, } ing.
 Wathmn, carpet.
 Wari, *s. m.* inflected }
 Wahras or Warihas. } year.

W.

Wodun, <i>v. n.</i> weep.	Waius, <i>s. f.</i> ages, years (only to a number.)
Wōnun, to weave.	Wazum, <i>adj.</i> loan, agreeing with the substance lent, used with
Wōwun, to sow.	dyun, hyun, or tsatun.
Wudun, to fly.	Wachh, <i>s. m.</i> breast.
Wushinun, to become warm.	Wäd, <i>s. f.</i> head (to)
Wyethun, to become fat. (in sco.)	Vyuth, } Vyith, <i>s. f.</i> } } fat. Vyechhis, <i>f. p.</i> }
Wyethráwan, to fatten.	Vyechar, fatness.
Walan, to cover (as with clothes.)	Wal, <i>m.</i> hair.
Wáyun, to plough.	

Y.

Yetsun, <i>v. a. r.</i> wish.	Yer, <i>s. m.</i> wool.
	Yachh, <i>adj.</i> indeclinable, bad, ugly
	Yed, <i>s. f.</i> belly.
	Yél, overcoming.

Z.

Zún, <i>s. f.</i> moon.	Zanún, <i>v. n.</i> to know.
Zú, <i>s. m.</i> life.	Zenun, <i>v. n.</i> to win.
Zúhar, length.	Zyonñ.
Zýuth, <i>m.</i> elder (brother.)	Zenyi.
Zithi or zith, <i>f.</i>	Zethun, <i>v. i. ch.</i> to become, or be-long.
Ziche.	Zechhar, length.
Zárpár, excuses.	Zichhar, elderness, being older.
	Zal, <i>s. m.</i> not.
	Zalún, <i>v. a.</i> to burn.
	Zalún, to have a certain disease in the breast? (a cough?)
	Zýun, (probable zu and yun), to be born, to be curdled.
	Zaorun, <i>v. a.</i> to beget, curdle.
	Zaorum, regular.
	Zang, <i>s. f.</i> leg (the whole.)

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